THE AMERICAN GAS LIGHT JOURNAL

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME XCII., No. 23. Whole No. 1,826. | NEW YORK, MONDAY, JUNE 6, 1910. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. H. WADELTON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

Published on each Monday of the year, at No. 42 Pine Street, New York City.

Telephone.—2996 John.

Terms of Subscription, Including Postage.—For the United States, $3; Canada, $4 per annum. European countries, $5 (£1—25 francs).

Remittances should be made either by post office order, express money order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

Collections are invariably made directly from this office for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

The American News Company, Nos. 39 and 41 Chambers street, New York, are agents for this JOURNAL. Newsdealers will send orders to them. All payments to be made in advance. Single copies, 10 cents.

Indexes for the previous 6 months will be found in the First number of July and the First number of January.

Books.—We will forward by express, at publisher's lowest rates, any book—scientific or otherwise—to any address in the United States or Canada. We would suggest to our patrons that to avoid the risk and expense consequent on sending us the money (we do not send books C. O. D.), that orders for books be sent us through the Purchasing Department of the American Express Company.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

OFFICIAL NOTICES—

Sixth Annual Meeting, Iowa District Gas Association.....1081

Third Annual Convention, Canadian Gas Association.....1081

EDITORIALS—

Briefly Told 1081

Death of Mr. Edmund H. McCullough—Obituary Note, Mr. William Henry Smith—Accounting Every Business Man Should Know—Current Mention.

*A Simple and Accurate Gas Calorimeter, by Prof. Strache.....1083

*An Efficient Burner to Melt Stereotype Metal.....1084

*The Proper Method of Operating a Water Gas Machine, by Mr. M. Dewey.....1085

*Dry Gas Meters in Actual Operation, by Mr. P. E. Nichols.....1087

The Watt-Hour Meter in Actual Operation, by Mr. O. Brasher.....1088

*An Apparatus to Test Strong Aqua Ammonia, by Prof. W. C. Klotz.1090

The Mixing of Fireclays, by Mr. M. E. Page.....1090

*Piping for the Steam Plant, by Mr. P. R. Moses 1091

Fifth Annual Meeting, Natural Gas Association of America—[Official Report] 1093

First Day, Morning Session—Roll Call—Address of Welcome—Response by Mr. Garard—In Memoriam, J. B. McGowan—Report, Board of Directors—Amendments to the Constitution and the By-Laws—Reports of Secretary and Treasurer—Election of New Members—Inaugural Address—Messages of Regret.

Recent Patent Issues.....1097

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.....1097

Pemberton (N. J.) to Have a Gas Works—What They Think of Mr. Perkins—Personal—Mr. Battin Goes Higher—Something from Butte, Mont.—Messrs. O'Neill are Pensioned—Proposed Works for High Point, N. C.—Mr. J. Powers Petitions the Selectmen—Mr. M. C. Whitaker Goes to Columbia College—Circulating Gas Water Heaters for the Fire Department—Personal, Mr. A. J. Healy—Mr. C. B. Roberts Still Advises—Personal—Dispute Over Natural Gas—The Elgin (Ills.) Controversy—Los Angeles, Cal., and Its Board of Public Utilities—Proposed Works for Port Clinton, O.—The Telephone Company was Responsible—And Other Items.

The Market for Gas Securities.....1099

Public Lighting Tables for June, 1910.....1110

[OFFICIAL NOTICE.]

Sixth Annual Meeting, Iowa District Gas Association.

IOWA DISTRICT GAS ASSOCIATION,
OFFICE OF THE SECRETARY,
DES MOINES, IA., May 28th, 1910.

To the Members, Iowa District Gas Association: The Sixth Annual Meeting of the Iowa District Gas Association will be held in Sioux City, Ia., June 15th, 16th and 17th, 1910. The meeting will be called to order at 10 A.M., June 15th, by the President, Mr. Geo. H. Waring, of Omaha. The following papers will be read:

"The Gas Company's Policy Toward the Public," by Mr. Campbell Fair, Oskaloosa, Ia.

"Depreciation," by Mr. R. Shacklette, Detroit, Mich.

"How we Increased Gas Sales in Lincoln," by Mr. J. E. Shuff, Lincoln, Neb.

"Boiler Fuel Leaks," by Mr. J. B. Myers, Omaha, Neb.

"Advantages of High Pressure in a Low Pressure System," by Mr. B. C. Adams, Lincoln, Neb.

"Distribution in a Small Gas Plant" (Special references to general operation, street leakage, station meter, etc.), by Mr. A. W. Borden, Hasting, Neb.

The following standing committees will report: New Business; Gas Works' Construction; Gas Manufacture; Distribution; Uniform System of Accounts.

In addition the following special features will form part of the programme:

1. A lecture by Mr. Rufus C. Dawes.
2. A lecture by Mr. Norman Macbeth, illustrated with lantern slides, on "Illuminating Engineering Factors in Gas Illumination."
3. A lecture by Mr. J. B. Klump, on the "A B C. of Calorimetry."

The headquarters will be at Hotel West. Best accommodations are always obtained by reservation secured in advance. For further information address, G. I. VINCENT, Sec'y and Treas.

[OFFICIAL NOTICE.]

Third Annual Convention, Canadian Gas Association.

CANADIAN GAS ASSOCIATION,
OFFICE OF THE TREASURER,
WOODSTOCK, CANADA, April 19, 1910.

The Third Annual Convention of the Canadian Gas Association and the first gas show ever held in Canada, will be held in Alexandra Rink, Hamilton, Ont., June 6th to 11th, inclusive. The Canadian Gas Association indorses to the fullest measure the exhibition.

Yours truly, A. W. MOORE, Secretary.

LIBRARY OF CONGRESS
JUN 6 1910
SMITHSONIAN DEPOSIT.

BRIEFLY TOLD.

DEATH OF MR. EDMUND H. MCCULLOUGH.—With exceeding regret we chronicle the death of Mr. Edmund H. McCullough, President of the Westmoreland Coal Company, Philadelphia, who passed away the morning of the 31st ult. His illness was of such short duration

that it caused a great shock to the employees of the Company, for all had learned not only to respect his methods and ways and to admire his even temperament, but also to love his personality, which was of the sort that leavens the turmoil of life with abiding faith that death does not end it all.

OBITUARY NOTE, MR. WILLIAM HENRY SMITH.—"William Henry Smith, Superintendent of the City (Philadelphia) Distribution District, died in Lansdowne, Pa., the 16th of May, 1910, in his 61st year. His connection with the gas industry began some time prior to 1874, in which year he was sent from New York city to erect some apparatus in the Bayonne (N. J.) gas works. At the conclusion of his construction work he was employed by the Bayonne Company as gas works' foreman, remaining in this position until October, 1887, at which time he was promoted to the place of Superintendent. He resigned this latter office in March, 1896, to become Superintendent of the City District of the Distribution Department of the Philadelphia gas works, which position he occupied at the time of his death. During his term as Superintendent at Bayonne he had the duty of initiating into the gas business Mr. Alexander C. Humphreys, formerly General Superintendent of the United Gas Improvement Company, and now President of the Stevens Institute of Technology, Hoboken, N. J. In Philadelphia he trained many young men in the business. He had a fatherly interest in them, and was exceptionally skilful in developing them along lines of useful service. He gained his knowledge of the gas business in the school of experience; and the knowledge so gained, combined with his rare practical sense, imparted a quality of wisdom to his decisions, and an efficiency in the management of his department, which are unusual. He executed, with consummate skill, in the most congested part of Philadelphia, the reconstruction of the system of mains, services and meters, incident to the transfer of the Philadelphia gas works from the Bureau of Gas to the United Gas Improvement Company. His rugged honesty, vigorous personality and straightforward manner inspired confidence in those of the public with whom he came in contact, and endeared him to his associates.—F."

"ACCOUNTING EVERY BUSINESS MAN SHOULD KNOW."—Such is the title of a volume recently issued from the press of Doubleday, Page & Co., which concern left nothing undone that it should have done in getting out in excellent "typeing," paper and binding, the "copy" of the author, Mr. C. E. Garrison. The first half of the tome gives to the uninitiated a very plain, wherefore readily understandable, lesson in the art of bookkeeping, and the tome then goes on to show the benefit, yes, the necessity, of being able to know, at a moment's notice, at any time, the exact condition of one's business and the immediate changes made therein, by a correct system of accounting. It contains many valuable hints on the devising of systems for showing the fluctuations of profits and expenses in running different departments of a business on inventory systems, reserves, etc., so that a statement of results may be readily shown. In respect of this Mr. Garrison remarks: "One object of the application of such close reasoning to the recording of the current history of a business lies in the fact that it affords the weapon necessary to prevent drawing out of the business in dividends more of its life blood than is consistent with continued or increasing activity. It is at the same time the only way of telling the actual truth about the operation and present values." The author also calls attention to the importance of charging certain items, or crediting them, to the proper accounts, which otherwise would cause the balance sheet to become a misleading document; and his strong plea is for the employment of an expert accountant, whenever one is in doubt, and the benefit from such a procedure is clearly explained.

CURRENT MENTION—

THE Piedmont Railway Company has purchased the properties of the Salisbury (N. C.) and Spencer Railway Company, which comprise the electric line from Spencer, through Salisbury to Fulton Heights Park, the electric light system of Salisbury, and the Spencer gas works, which is counted on to supply both named places. The gas plant will be enlarged.

AT the annual meeting of the Winchester (Va.) Gas and Electric Light Company, the officers chosen were: Directors, Messrs. W. S Love, John M. Steck, Geo. W. Kurtz, Jno. H. Cunningham, J. W. Russell and J. B. Russell; President, W. S. Love; Vice-President, Jas. B. Russell; General Manager, John H. Cunningham; Secretary and Treasurer, H. J. Turtle; Superintendent, J. F. Goss.

THE gas supply to the City of Mexico, from the new works recently erected there by American capitalists, was turned on last week. The occasion took on the form of a regular gala *fiesta*.

ADVICES from Louisville, Ky., under date of the 29th of May, are to this effect: "Activity in the shares of the Louisville (Ky.) Gas Company, the Kentucky Heating Company and other shares included in the proposed merger of local lighting and heating utilities, has given rise to a belief that the presumed merger is nearer to actual consummation than had been supposed. Inquiry on close account develops that none of the promoters of the merger were, up to to-day, willing to say that the merger is yet a certainty, although it is admitted that considerable progress has been made in the way of satisfying the wishes of the various Companies. If the merger goes through the Kentucky Heating Company and the George G. Fetter Company will be purchased outright, and the Louisville Gas Company, Louisville Lighting Company and Kentucky Electric Company consolidated. The details of the franchise, which must be secured from the General Council, have not as yet been adjusted. While the final consummation of the merger is looked upon as a probability, nothing definite can be done until the Mayor and the General Council grant an exclusive franchise to the proposed Company."

THE Committee on Lectures, Illuminating Engineering Society, through Chairman E. P. Hyde, has issued a circular respecting the proposed Illuminating Engineering Course, at Johns Hopkins University, Baltimore, which should be carefully studied, and which can be obtained by writtng to Mr. Preston S. Millar, General Secretary of the Society, at his address, 29 West 39th street, New York. The circular from the Lecture Committee of the Society, which is repeated below, is sufficient to show the importance of the proposed course:

As announced in the accompanying circular, issued by the Johns Hopkins University, Baltimore, a course of 36 lectures on Illuminating Engineering, extending from October 26 to November 8, 1910, will be given at that University. This course of lectures has been arranged upon the initiative of the Council of the Society, which by resolution decided to organize such a course and appointed a committee to take the necessary steps to that end.

The lectures, which will be given under the joint auspices and control of the Society and the University, will follow immediately the annual Convention of the Society which, upon the invitation of the President of the Johns Hopkins University, will be held at that Institution, beginning Monday, October 24, 1910.

The course of lectures, the three-fold object of which is stated in the announcement of the University, should merit the support of those interested in Illuminating Engineering, to all of whom the course is open on equal terms. The scope of the lectures, together with the list of lectures, should insure a large and representative audience. Cards of admission to the course, and information regarding the facilities for individual laboratory work, can be secured upon application to the Registrar of Johns Hopkins University or the General Secretary of the Illuminating Engineering Society.

THE Clinton (Ia.) Gas Light Company is making extensive improvements on its plant, and the remodeling of the retort house is under contract to the Gas Bench Construction Company, of St. Louis. Under the agreement a new bench full-depth 9's is being installed, and three of the existing benches of 9's are being remodelled. Notable improvements in the Company's purifying and condensing systems are also underway.

MR. FREDERICK H. SHELTON sails for Europe, per steamer "Cincinnati," from New York, on the 11th inst., intending to remain abroad for 3 months or more. The best that we can wish him is a good voyage, an enjoyable outing time and a safe return, and all these we certainly wish for him in heaping, heartiest measure. He is accompanied by Mrs. Shelton.

MR. ISAAC C. ELSTON, having secured a large interest in the shares of the Detroit-Suburban Gas Company, has been appointed General Manager of the affairs of that rapidly growing concern. This gentleman's career in the gas business shows how much may be accomplished in comparatively short time by minding one's business and sticking to it.

THE semi-annual meeting of the National Gas and Gasoline Engine Trades' Association will be held in Cincinnati, June 13 to 16, with headquarters in the Sinton Hotel. The paper list stands for 18 numbers notably one by Mr. W. R. C. Smith, of Atlanta, Ga., who will write on the "Present and Future Opportunities in the South for the Gas Engine Builder," and another by Mr. R. W. Jones, of the Peoples Gas Light and Coke Company, of Chicago, whose theme is the very fruitful one of "Some Things We Need in the Gas Engine Business"—and these things are many, as that business has been run (in this country at least) for a number of years.

[Translated for the JOURNAL, by HERR LUEDERS.]

A Simple and Accurate Gas Calorimeter.

By PROF. DR. H. STRACHE, Vienna, Austria, in *Journal für Gas Beleuchtung.*]

The many new constructions of new instruments for determining the heat value of gases prove the necessity for a cheap instrument in stead of the comparatively expensive Junkers' calorimeter; but the instruments constructed up to this time, while simple enough in operation, have not had the required accuracy.

The principle of the Junkers' calorimeter is to heat flowing water by an evenly burning flame, and to measure the quantity of water heated by a certain quantity of gas to determining at the same time the increase in temperature of the water heated by the gas. This process necessitates the use of a water pipe line and of a drain pipe line, therefore, the Junkers' calorimeter is not so practicable that it can be used directly or without certain preparation at any desirable place.

The principle of other calorimeters is that the radiation of a body heated by a gas flame must be constant for a certain temperature. This, however, is not at all so, on account of the variation of the surface and of the differences of the currents of the air, wherefore, inaccurate results are obtained with them.

The inventor endeavored to construct a cheap, but nevertheless accurate, instrument independent of a water pipe line, and for this purpose he determined the quantity of heat obtained by the explosion of a mixture of gas and air. This method at the same time has the advantage that results can be obtained by the use of very small quantities of gas, and loss of heat can be entirely avoided if the explosion vessel is entirely surrounded by the material absorbing the heat.

The quantity of heat from the explosion can be measured best by the expansion of the material absorbing the heat. In the first place the inventor intended to use a vessel, similar to the explosion pipette, completely surrounded by another vessel filled with water, and to measure the expansion of the water caused by the heat in a capillary tube combined with the water vessel. The time, however, necessary for the total absorption of the heat by the water being considerable, furthermore, as the glass vessel expands considerably in volume by the sudden heating, as well as by the pressure, of the explosion, the water in the capillary tube shows variable positions whereby the accuracy of the indication is injured. The author, therefore, endeavored to measure the expansion of the air contained in an air jacket surrounding the vessel of explosion concentrically, whereby an accuracy of indications is obtained surpassing those of the Junkers' calorimeter. The advantages of this arrangement compared with the Junkers' calorimeter are the following:

1. The independence of the calorimeter from a water pipe line, drain pipe and other installations.

2. Determinations of the heat value of the gas can be made in any place in the gas works.

3. The small amount of gas of only 30 ccm. (1.83 cubic inches) necessary for a determination, whereas with the Junkers' and other calorimeters there are required not only 3 liters of gas (.106 cubic foot) for the determination, but a further considerable quantity is necessary for the blowing out of the gas meter.

4. The speed with which the determinations can be made, the time necessary for the taking in of the air of combustion and for the blowing out of the gases of combustion being very short, so that a determination can be made within 3 to 5 minutes.

5. The simplicity with cheapness of the apparatus, which enables even a small gas works to buy this accurate calorimeter; also, the simplicity of the operation, which is restricted to the setting of a few cocks, so that a determination can be made by a laborer.

6. The exactness of the determination.

7. The independence of the determination from temperature and atmospheric pressure, since, by comparison with a standard volume, a corresponding quantity of gas is measured and the result obtained is directly reduced to 0° C. and 760 mm. atmospheric pressure (32° F. and 29.92 inches).

Fig. No. 1 shows the elevation and No. 2 the general appearance of the calorimeter. In this 6 is the glass explosion pipette surrounded by 12, the glass jacket. The two electric wires 22, penetrate both vessels; the wires are connected with an induction coil 10, and a plunge battery 11. The explosion pipette 6, is filled with water, by

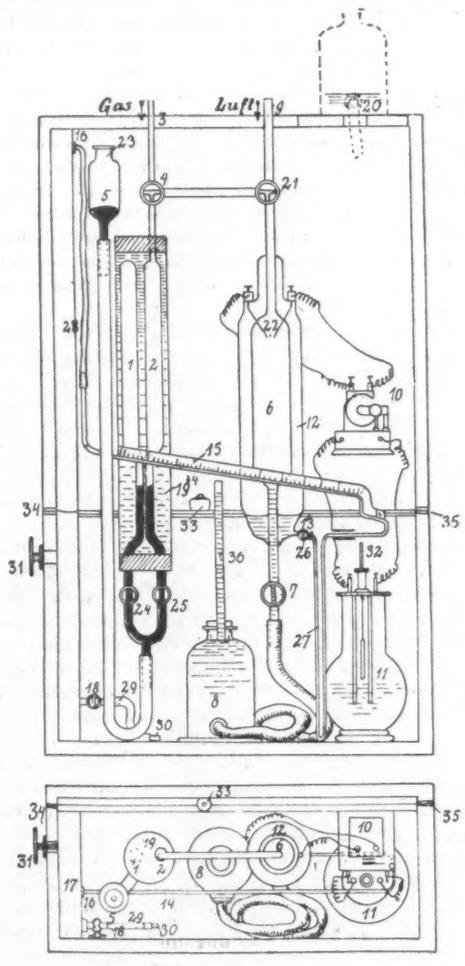


FIG. 1.

lifting the leveling bottle 8, to the stand 20, on top of the box, and by setting the cocks 7 and 21, so that the air can escape through pipe 9. The water content of the bottle 8 is so adapted that there is just water enough to fill pipe 9.

The measuring of the gas is made as follows: In the water-filled glass jacket 19, are two measuring tubes, 1 and 2, of exactly the same size, connected with a leveling bottle 5, filled with mercury, as shown in the drawing. In 1 a volume of air is included which is exactly 30 ccm. at 0° C. and 760 mm. atmospheric pressure. Usually, *i. e.*, at the temperature of the room and at low atmospheric pressure, the air expands so that the level of the mercury stands in the lower narrow part of the measuring tube. Now, in order to measure a volume of gas corresponding to that of air, the measuring tube 2 is brought in communication with the gas pipe connected with tube 3, by rubber tubing, by turning the 3-way cock 4. Then the leveling bottle 5 is lifted from the holder 23, and let down so far that, after opening the cocks 24 and 25, the levels of the mercury are exactly alike in the narrow parts of the measuring tubes 1 and 2, as can be seen from the drawing.

Under these conditions the volumes of gas in 1 and 2 are under exactly the same pressure, since the mercury communicates with both tubes through the open cocks 24 and 25; furthermore, these gas volumes have the same temperature by means of the water jacket 19.

For these reasons it is possible to always measure out a volume of gas, which, at 0° C. and 760 mm. pressure, would be exactly 30 ccm, without knowing the actual volume of the gas. The pressure of the gas in the gas pipe line has no influence on this measurement, since this pressure is transferred through the mercury, and the cocks 24 and 25 upon the standard volume in the measuring tube 1, and affects there the state of compression in the same way as in measuring tube 2. In this operation of the measuring of the gas the leveling bottle 5 must be kept, of course, at the height of the mercury level in the measuring tubes, which is easily done by moving the bottle up and down to find the position where the two mercury levels

are exactly alike in 1 and 2. After turning the 3-way cocks 4 and 24, any measured volume of gas can be transferred to the explosion pipette 6. For this purpose the mercury bottle 5 has to be lifted to the holder 23 at the top of the box of the apparatus. The quantity of mercury in 5 is such that, with cocks 4 and 21 opened, it just comes up to the cock 4, and does not flow over to the explosion pipette.

In order to draw the air into the explosion pipette, the water bottle 8 is lowered to the bottom of the box, and the cock 21 is turned into a vertical position. The air then enters through 9. The mouth of the bottle 8 contains a glass tube, and the capacity of the bottle is of such size that the water in the explosion pipette 6 can run down to the narrowing of the same, the water in the glass tube of the bottle is then at the same level.

The measuring of the expansion of the air volume, 12, surrounding the explosion pipette, is made by means of a slanting manometer tube, 14. The receiving vessel for the manometer fluid, 13, is formed by the downward elongation of air jacket glass, 12. Cock 26 shuts off the air in 12, if the apparatus is not used. Connected with cock 26 is a siphon tube, 27, and a slanting manometer tube, 14. The siphon tube, 27, prevents the entering of air bubbles into 12, if cock 26 is opened. Petroleum is used in 13 for a seal, preferably to water, on account of its low vapor tension and mobility.

The manometer tube, 14, is connected at the other end with the tin box, 17, on the back wall of the apparatus, by the rubber tubing, 28. It is necessary to guard the free end of the manometer tube before the fluctuations of the atmospheric pressure. These fluctuations are so great, within 10 to 20 seconds, that the manometer shows a continual oscillation of more than 10 mm., if this end of the manometer is left open. Before the gas mixture is exploded the cocks 7 and 21 are closed. The manometer is then put at the zero point, by blowing into or taking air out of the vessel 17, through cock 18. For this purpose the cock 18 is connected by rubber tubing 29 with the mouthpiece 30. A finer focusing can be obtained by the movement of screw 31, which increases or decreases the air volume of the vessel 17, by a slight pressure upon the elastic wall of the tin box.

After focusing the zero point the gas mixture is exploded by lowering the zinc plate of the plunging battery, 11. After the explosion the zinc plate is removed from the liquid of the battery by the handle 32, or by a spiral spring, thus preventing frequent removal of the liquid of the battery.

Immediately after the explosion the cock 21 is again turned into the vertical position, in order to compensate the contraction due to the combustion by the admission of air through 9. If this would not be done the result would represent the heat of combustion of a gas for a constant volume, while usually the heat of combustion is desired at a constant pressure. By the admission of air the quantity of heat is recovered which results from the compression of the air in the explosion pipette 6. Immediately after the explosion the manometer fluid in 14 rises, and after a few seconds it reaches the highest position, which it keeps long enough to take an accurate reading. After the reading the water bottle 8 is returned to the stand 20, whereby the explosion pipette is again filled with water.

If a series of determinations is made the explosion pipette is heated so that, due to the radiation of heat, a sufficient constancy of the zero position of the manometer cannot be obtained. This can be remedied by heating to some extent the space surrounding the explosion pipette by means of a small alcohol lamp. The lamp is fastened to a sliding carriage 33, which can be moved to the right and left by the cords 34 and 35. Soon a position of the lamp will be found, where the irradiations of the explosion pipette and of the vessel 17, are such that the manometer remains for 10 seconds in the zero position, which is sufficiently long enough for an accurate determination. It is not necessary to make use of the lamp, if the highest degree of accuracy is not desired.

The adjustment of the apparatus is made by means of hydrogen of which the heat of combustion is known.

The process of the determination of the heat value is, of course, carried out much more quickly than can be seen from the description above. It consists of:

1. The lowering of vessel 5, for the measuring of the gas volume.
2. The turning of the cocks 4 and 21, and the lifting of vessel 5, to the holder 23.
3. The lowering of the water bottle 8, and the turning of the cock 21, for the admission of air.
4. The focussing of the zero point and the priming of gas mixture.
5. The reading of the fluctuation of the manometer and the lifting of the water bottle 8 to the stand 20.

With some practice all this is carried out within 3 minutes. Preparations of any kind are not required for a determination, as it is the case (for instance) with the Junkers' calorimeter. The determination can be made immediately after the gas pipe has been connected with tube 3, and after the air in the tubing has been expelled through tube 9.

The following is a series of determinations showing the accuracy of the determinations as well as the time used for same. There are no corrections to be made of the readings, as is necessary for other calorimeters to the standard temperature and atmospheric pressure (0° C. and 760 mm.).

Date of Test.	Hour.	Gas Used.	Pressure of the Gas Used. mm. Mercury.	Temperature. Degs. C.	Upper Heat Value Calories.
28/XII./09..		Hydrogen, upper heat value according to Thomsen, 3,052 calories.	752	16 4	3,060
			750	16 4	3,060
			748	16.7	3,050
			746	16 8	3,060
			750	16 8	3,045
			744	17 0	3,050
			748	....	3,050
			747	17.3	3,060
			746	17 4	3,060
			746	16 8	3,040
			752	17.4	3,065
			756	17.7	3,060
			754	17.8	3,040
			756	17 0	3,055
			757	18.3	3,065
			757	18.3	3,065
					Avg., 3,055
		Heat value of hydrogen at 0° ;60 mm , 3,052.			
29/XII./19..	9 : 14	Municipal Illuminating Gas.	751	18.7	5,020
	9 : 18		751	18.5	5,040
	9 : 21		751	18.7	5,020
	9 : 24		750	18 7	5,070
	9 : 31		751	18.8	5,055
	9 : 34		751	19 0	5,065
					Avg., 5,045
29/XII./09..	1 : 49	Municipal Illuminating Gas.	749	17 5	5,100
	1 : 50		750	18 0	5,100
	1 : 56		751	18 2	5,110
	1 : 59		751	18 3	5,105
	2 : 02		751	18.6	5,105
	2 : 05		751	18.7	5,100
	2 : 08		751	18.8	5,105
					Avg., 5,104

An Efficient Burner to Melt Stereotype Metal.

Mr. H. O. Loebell, in the current issue of the National Commercial Gas Association "Bulletin," explains that Fig. 1 represents a set

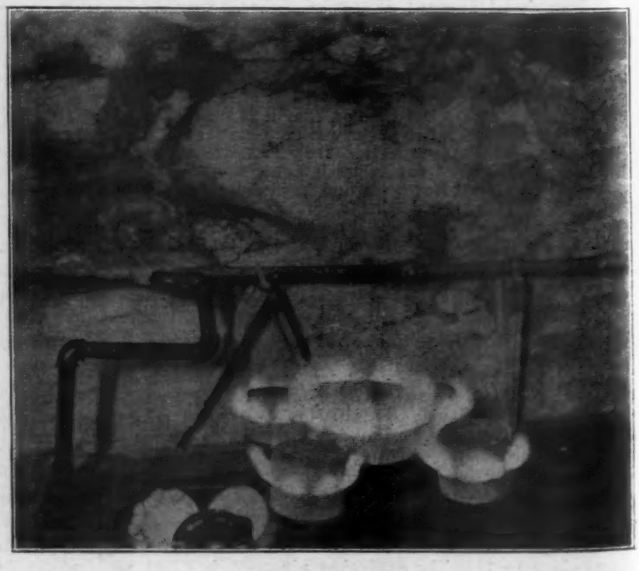


Fig. 1.—Refractory Burners.

of four 6-inch and one 10-inch refractory burners, in which the small ones are connected in pairs. The large one in the center operates on a separate valve.

All burners are connected on one manifold. With these burners, we have advantage in that the burners can be set in such a way as to follow the contour of the plot; perfect combustion must always take place, due to the high temperature which the burners attain, apart from the heat of the flue gases, a large amount of radiant energy is reflected from the incandescent burners, making the installation very efficient and durable.

Fig. 2 represents a metal pot in which these burners have been installed. They are giving perfect satisfaction and a saving of from 10 per cent. to 15 per cent. can be effected by the use of these burners over any other kind of atmospheric burners.

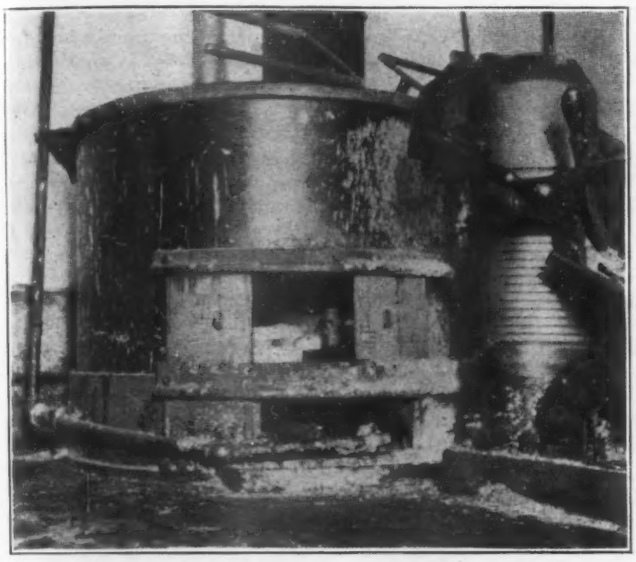


Fig. 2.—Stereotype Metal Melting Pot.

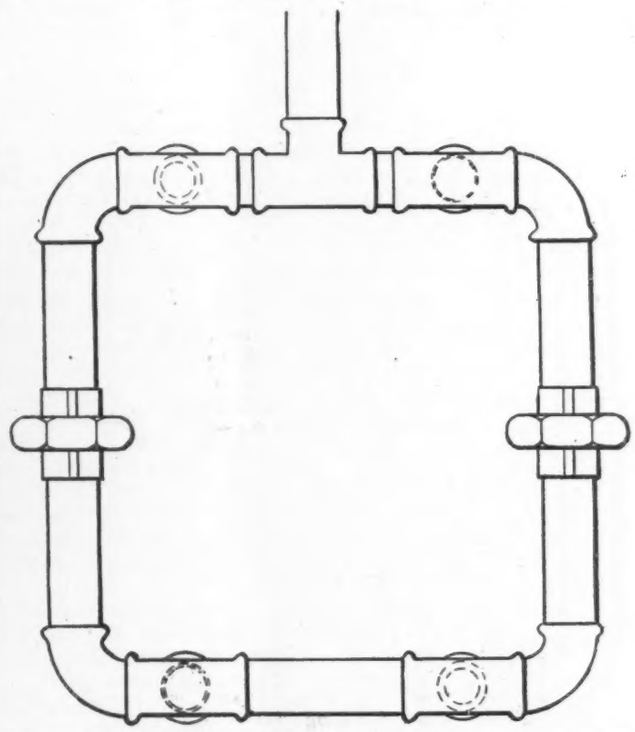
The consumption of all 5 burners is about 650 cubic feet per hour; the smallest burners consume 100 cubic feet per hour each, and the large one 250 cubic feet per hour.

The Proper Method of Operating a Water Gas Machine.

[Prepared by Mr. M. Dewey, for the last Meeting, Southwestern Electrical and Gas Association.]

Much has been written on the subject of water gas by men who have gained their experience in large plants and in cities where conditions are widely foreign to those which we represent. This paper aims to direct the way to economy to those who are operating plants here in Texas and adjacent States, and perhaps it may even serve as a stimulant to someone for the production of a thesis much more technical and exhaustive, consequently, of a greater value than the synopsis which is now before you.

In the manufacture of water gas, our aim is, of course, to make the largest amount of good gas in the shortest time, with the least expenditure of fuel, oil and steam, and to attain our ends, we must be on the alert from the time the plans for the plant are being made until it is worn out and no longer fit for service. By this I mean that, in order to realize the best of results, we must have a well and handily constructed machine, kept in good repair, and free from leaks, as well as perfect operation after its completion. It should be erected on a solid foundation and in close proximity to the boiler and blast engine, and, at the same time, be near the coal and coke sheds and the oil storage tanks. The clinkering doors on the generator should be arranged so that there is plenty of room for the use of long clinker bars and for the quick and easy handling of ash and clinkers. Water lines should be run in such a way that the operator can instantly adjust the amount of overflow on the seals in case of excessive pressure. The steam line to the generator must be of adequate size—that is, 1-60th the diameter of the generator shell. In regard to the distribution of steam in the generator, I speak timidly, because nearly everyone has widely varying ideas upon the subject of steam sprays. The best ones, in my opinion, are those that cause slightly more steam to pass up around the sides than in the center, as it leaves the clinker in the shape of an inverted cone and saves the lining to an appreciable extent. Here is a diagram of a steam spray now in successful use in San Antonio.



Steam Spray.

It is a mistaken idea, however, that a machine will be efficient on a very low or varying pressure of steam, and herein lies the cause of bad results in so many small plants. Steam must enter the generator dry and, in order to be positive of its dryness, it should even be superheated. The superheating is effected at the valve, where it is reduced in pressure, but not enough in temperature, to lower it to the saturation point. In the case of wet steam, the globules of water are made into CO_2 and H in the base of the fuel bed, leaving no work for the heated carbon in the center or at the top of the fuel to do. I have found that 100 pounds pressure at the boiler, cut down to 42½ pounds at the generator steam valve, is the best working pressure, and those who have not placed much stress upon the proper methods of using steam in the generator will not be the losers if they watch this matter closely.

Oil sprays of the needle valve type are best for machines of 8 feet diameter and under, but the rotating spray is used extensively and with excellent results on the carburetters of larger diameter. (Most sprays work best under 40 pounds pressure, although as low as 15 pounds is thought best by some operators.) Be that as it may, there should be sufficient pressure on the spray to atomize the oil and deliver it evenly over the entire top of the checkerwork. It is not fully enough realized that a poorly adjusted oil spray is the cause of a large percentage of naphthaline troubles. It is at least a well developed theory that naphthaline is formed by adjacent hot and cold localities in the carburetter, and this fault quickly brings forth such conditions. I shall touch but lightly upon the proper bricking to be used in a water gas machine.

The generator should be lined with the best of firebrick from a reputable firebrick company, and they should be placed very closely together with well broken joints in good fireclay made rather thin. Too much stress cannot be laid on good workmanship, as it makes a vast difference in the life of the lining. If there is a handy man around the plant, it would be well to have him master the trade of lining the generator.

The carburetter and superheater checkerwork should ordinarily be laid about 3 inches apart and should not, in small machines, be staggered, although it is best to use the staggered form in the superheater

of machines of 8 feet diameter and over. When I speak of staggered brick I mean that each row is directly over the space between the rows of the next lower course running in the same direction, and where they are not staggered, each row is directly above the others in the lower courses. The reason for not staggering them is to eliminate as much back pressure as possible when the machine begins to get dirty, and it also prevents the accumulation of ash and dirt in the space where the gas and blast must pass. One more suggestion on the construction of the machine concerns the safety seal and overflow to the seal. The factor of safety is not lessened by having an extra deep seal on the overflow, because what is lost in safety by increased pressnre and more liability of stoppage, is gained by the less frequent blowing of this seal, and also by the advantage of being able to crowd the machine to its highest capacity. A good many explosions have occurred on account of the blowing of the seal, and the deepening of it to about 40 inches would have avoided many of them. We now come to the actual operation of the machine.

In starting up a cold machine we, of course, expect poor fuel results for that day, when comparing them to regular days—but even in this, the difference in results between intelligent and careless operation is surprising. There are many little things to watch, and good judgment in each action cuts down the fuel per 1,000 very decidedly. I can explain the operation by giving a few rules as to what should and should not be done. Place a goodly supply of kindling, well saturated with oil, in the bottom of the generator. Add about 3 feet of coal or coke, as the case may be, light the fire, and, when well started, close the generator doors tightly and start a low blast, leaving the generator lid off. When the gases begin to light, fill the generator ½ full (if with coal), or ⅔ full if coke is used; then, when the gases light in the air above the charging opening, drop the blast, close the lid and use 8 inches blast, gradually increasing until the carburetter lights. Then blast the generator full and raise the carburetter blast valve just enough to consume the blast gases, but never more than ⅔ full. When ⅓ of the full carburetter blast is not enough to take care of the producer gas at the stack, raise the superheater valve. After 25 or 30 minutes blast, a careful operator will have his generator, carburetter and superheater in shape for the first run at the same time. To do this it may be necessary to blast the generator low for a part of the time, but at all events it must be brought about or poor results are inevitable. On the first run much less oil should be used in the carburetter than ordinarily, as the firebrick is not as yet thoroughly heated. In fact, not until after a second coaling or third coking are normal conditions existent. During all this time the operator should watch closely the heats at the top and bottom of both the carburetter and superheater, and the heat of the generator is well known at all times of the blast by noting the color and sound of the gases as they enter the stack; also, by the smell of the machine and the gases in the air around it. Thus you see, a good operator must be on the alert at all times, using nearly all of his senses.

We now wish to determine the proper length of blast and run. and in doing so we must consider the following factors:

If the blast is too long, the machine is then too highly heated, causing low candle power, thick tar, lampblack stoppage and quick deterioration of the firebrick. Too much fuel is consumed and sent through the stack, as well as too wide difference in temperature at the beginning and end of the blast.

If the blast is too short the machine is underheated, causing steam to pass through undecomposed and killing the fire in the generator. The oil is not firmly fixed into gas, thereby condensing, and is partially if not entirely lost. Too much time is wasted putting on and taking off the blast.

If the run is too long the fire is killed in the generator, leaving much unburned fuel in the ash and clinker. The oil is made into lampblack and hydrogen at the first of the run and is wasted later. The percentage of CO_2 is too great near the end of the run.

If the run is too short the make per hour is decreased, as well as the make per run. Time is lost in putting on and taking off the run. Also, full advantage is not taken of the fuel.

Now, in my opinion, the proper way to determine the length of run is by the use of the Orsatt apparatus, which should be a part of the equipment of every progressive manufacturing plant, and in using this two methods are proper. First: When the machine is in perfect heat, take samples of the uncarburetted water gas at the end of each minute for about 9 minutes and note the percentage of CO_2 in each sample. Then disregard all samples which contain less than 8 per cent. or more than 15 per cent. CO_2. Note the time it takes to heat the generator after running the number of minutes, indicated by the sample nearest 10 per cent CO_2. Use this length of run and blast under normal conditions for a few days and note the make per run and fuel per 1,000. Try 1 minute more run and 1 minute less and you can then decide which is best. Second: Test the gas in the commercial holder several times each day for several days, using an arbitrary length of run. If coke is used for fuel and normal conditions prevail, a maximum of 7 per cent. CO_2, or a minimum of 3½ per cent., is the limit of good practice. If coal is used, the limits are between 6 per cent. and 2 per cent. CO_2. Find your best results with respect to fuel and candle power per gallon and you have a properly timed run and blast.

I will now take up the subject of high and low fuel beds, discussing it at first when hard coal is used, and later with coke. Nearly every authority on water gas practice advises the use of a high fuel bed, and seldom do they even go so far as to say that, in some cases, a low bed might be better, or even as well; but I propose to risk their condemnation by saying that sometimes, and in some cases, a low fuel bed is advisable. When anthracite coal is used, and the machine is in use only in the daytime and lies idle at night, it is the height of folly to fill the generator to the neck before the first run, because the heat capacity of anthracite coal is so high that it requires a great deal of heat to bring a large mass of it to the gas-making temperature. If, therefore, we have a thick bed of cold fuel, it will be necessary to consume a large amount of coal at the bottom to sufficiently heat the top; consequently, a large waste of fuel on the first blast, which is extraordinarily long; also, the lining of the lower part of the generator and the clinkering doors must suffer from the intense heat generated on the bottom of this thick bed. Again, such high heat produces a molten clinker which hardens to nearly diamond hardness during the first run and, you see, we have a "dirty" generator early in the day. If the operator, instead of filling his machine full at the first, would use only ½ more fuel than the ordinary coaling to start up the machine, and if he gradually worked up to a high fuel bed during the first 3 coalings, and at the close of the day, if he gradually worked down to a low fuel bed, his fuel consumption under parallel conditions would be materially less. It is true, however, that the percentage of CO_2 will be slightly greater during the period when the fuel bed is low, but the difference in terms of candle power and heat units is so slight that we may call it negligible. When coke is used as a fuel conditions are decidedly different, and I may safely say that in all cases a high fuel bed should be placed in the generator at first and maintained until the last, when it is advisable to end the day by making 2, or possibly 3, extra runs on the last coking. The reason for this lies in the greater porosity and the much lower amount of heat in the coke bed compared to the coal bed; or, in other words, the steam does not strike as much carbon of the right heat while passing through the coke in the same height of fuel bed as it would with anthracite coal. Unless the conditions of the fuel are uniform from day to day, you will obtain varied and apparently confusing results.

We have now discussed the proper plan and construction of the plant, how to start it, how to determine the proper length of run and blast, and how to carry our fuel bed. Now we are ready to go on with our day's run and, in order to keep the grouch from the foreman's face in the morning, when he sees the daily report, we must observe closely the following hints on the general operation of the machine:

After the machine is started and normal working heat is obtained, the runs must be put on-and-off very accurately. This may sound strange, in that the length of the run is, in a measure, arbitrarily determined. However, it is explained by the fact that the machine is operated to give best results at a given length of run-and-blast, and any deviation causes the machine to be unfit to begin the next run, and 5 seconds, more or less, on each run mounts up to many dollars of extravagance in fuel at the end of the month. The oil per run, of course, must be determined by the candle power of gas made and the candle power desired. Now, the heat of the fuel should be such that, when the generator lid is opened up for coaling or for coking, the top of the bed should be uniformly a bright red, having plenty of red color, but no semblance of darkness. This heat is quickly recognized by a good operator, as he critically views the whole top of the bed. Should there be any dark spots, 1 or 2 conditions have caused them. Either an excessive amount of steam has found its way through the fuel at that spot, or else the machine is badly in need of clinkering. The former is always the case in a clean machine and is remedied by placing the bulk of the next coaling over that spot or by packing it with a bar. The presence of a dark spot in a clean generator causes

bad results if not immediately remedied, and if it is found in a generator that has been run a long time without clinkering, it is almost useless to continue until the cause is removed. A moment's thought will show you why bad results are caused by dark spots and in what way the gas is damaged; namely, a large amount of undecomposed steam, a large amount of CO_2, a small make per run, a low candle power per gallon and high fuel results.

Now, in order to keep our fuel bed homogeneous and to allow but little fuel to be taken up by the ash and clinker, we must use care and good judgment in apportioning the down-runs –that is, the reversing of the flow of steam through the fuel bed; and in doing this we must not jump at conclusions too quickly, because several factors are to be taken into consideration. In fact, it is so dependent upon construction of the machine and local conditions that it is hard to discuss the subject in a general way. It is usually the case that a down-run will cause more CO_2 to be made than an up-run; also, a higher back pressure on the generator will be found, especially at the beginning of the run. This is due partially to a larger make, partially to the smaller connections to the carburetter. A down-run will drive the base of the heat closer to the grate bars, causing lower and harder clinker, and, if too frequent, a quick deterioration of generator lining. It also causes the carburetter to become partially cooled at the beginning of the following blast, because the top of the fuel bed has been cooled by the steam. If an operator is not thoroughly conscientious he is very likely to waste time during a down-run, for it requires less physical exertion to put-on and take-off a down-run improperly than it does if the right method and quickness are used; and although this time lost is slight, yet it goes along with many other little oversights, which make a balance on the wrong side of the ledger.

Concerning the apportioning of down-runs, it is customary to make the first two runs after and the last one before cooling up-runs. This means that when coal is used the logical down-runs will be the 3d, 6th and 9th in a 10-run coaling, or else the 3d, 5th and 7th in a 9-run coaling. Good results are being obtained where the last run of coaling is a down-run, and there are arguments to show it to be practical.

With coke, where there are never more than 6 runs to the coking, and more often 5 or 4, experience proves it to be practical to make the 3d run a down-run. The percentage of down-runs, when coke is used, should be regulated by the number of runs to the coking.

The proper method of putting on a down-run is to turn on a small amount of both up-and-down steam after dropping the blast, lower the down-run valve, turn off the up-run and open up the down-run steam simultaneously. The run should be taken off exactly as it was put on, in which way no gas is left in the connections, which frequently cause explosion when the blast is raised; also, no time is lost when this method is followed out. I again wish to emphasize the idea of quickness. It is needed on the down-run most of all, its efficiency depending greatly upon the actual time that gas is being made.

After a period of 8 to 11 hours of running the machine must be clinkered; that is, all dead material at the bottom of the fuel bed must be removed. Now, the hardness of this clinker depends upon the method of operation and the kind and quality of fuel used. For economy's sake, this dead material must be removed as completely and as quickly as possible. Therefore, use as many men as can work handily at the clinkering doors and teach them to work fast, removing all of the dead material before breaking the crust of clinker that holds up the fire, then, to break this crust at the center, working out to the edges, to pull out all non-carbonaceous matter as soon as it is loosened, and to end up by cutting all of the pieces which have been melted and fastened themselves to the generator lining; and last, to insulate the door linings with ashes, brick or other non-combustible material. Speed is desirable in this work in order to prevent the fuel remaining in the generator from burning up, due to the draft which comes through the clinkering doors. This draft can also be deterred by lowering the stack valve until it is nearly, but not quite closed. If the machine is used only in the daytime never clinker at night, but have the clinkering done just before starting the day's run. If the clinker climbs up on the sides, so that it is necessary to clinker the machine from the top, one of three faults is indicated. Namely; poor clinkering, too much steam on the sides of the generator and too little in the center, or too few down-runs. The real cause is evident when the nature of the clinker is known.

I will conclude with a few remarks concerning appliances that help to relieve the operator of some of the responsibilities of his work, and that eliminate much of the personal error which comes from poor judgment of the man at the wheel.

The constant volume blast regulator is a device which delivers automatically to the machine a constant amount of air per unit of time, regardless of the varying back pressures of the machine. This device has only recently been patented and is not thoroughly introduced as yet, but its positive accuracy and its simplicity insure its introduction to us all. The constant weight and pressure steam regulator has like advantages and the two appliances should advance hand-in-hand.

The pyrometer, which is now stepping into prominence, is already in use by many of the larger companies. I understand that it is considered invaluable by many competent and highly informed gas men.

The recording pressure gauge on the generator, posts the operator on the condition and efficiency of his machine wonderfully, and I can personally recommend this appliance.

Gentlemen, I have now touched upon many of the points that are of vital importance in the operation of a water gas machine, and that are usually not thoroughly understood by the operators themselves. The author invites criticism and a lively discussion on his paper.

Dry Gas Meters in Actual Operation.

[Predared by Mr. P. E. Nichols for the Last Meeting Southwestern Electrical and Gas Association.]

Since last November I have been managing the meter department of the Galveston Gas Company, and during that time I have made a careful study of dry gas meters in actual operation. Since I came to this Company we have brought in about 1,100 meters from actual service, and, as it is my duty to inspect each meter immediately after it is brought to the shop, I have had a chance to examine meters which have been operating under widely varying conditions. The results of this study I will endeavor to give you.

There are three qualities which the meter must have in order to give the operating company the best results. These are: Accuracy, capacity and durability, the first being the most important point.

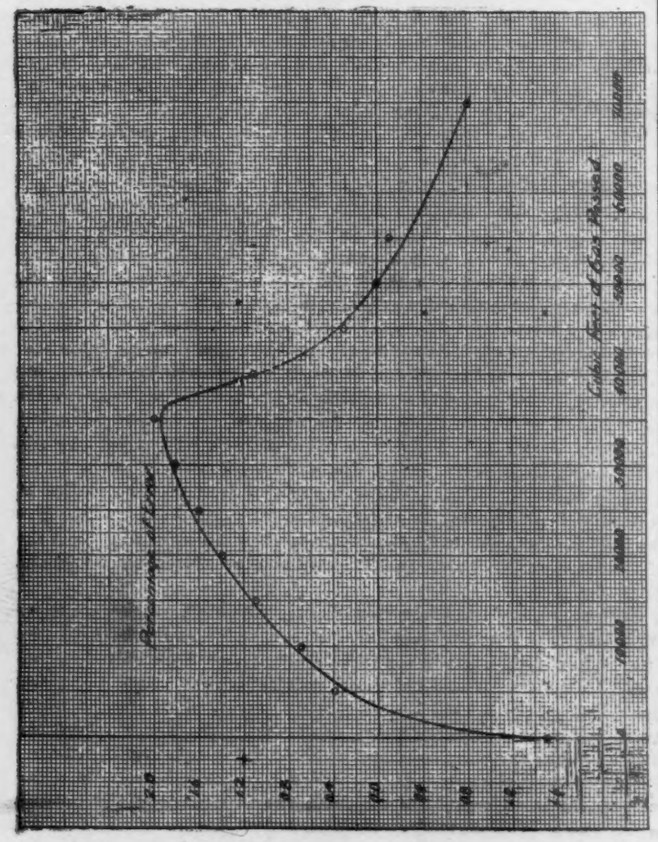
There are three chief factors which affect the accuracy of the gas meter, viz.: Quality of the gas passed, condensation which collects in the meter and changes of temprature to which the meter is subjected. The accuracy of a meter depends almost entirely upon the condition of the diaphragm. When the diaphagrm is placed in the meter it is saturated with an oil which makes it very pliable, at the same time preserves it from the action of the gas and condensation. Then we may say, that as long as the diaphragm retains this oil, the meter will be an accurate measuring instrument. This narrows the question of accuracy to one of keeping the diaphragm well oiled. There are several oiling devices on the market, but as yet there is none that I know of which is universally satisfactory.

The first factor affecting the accuracy of the meter—viz, quality of gas passed—while very important, is usually eliminated at the gas works. If the gas contains an excess of sulphur in any form the diapharagm will rot very rapidly and the effect of acid in the gas is the same.

The second, and most important factor, which affects the accuracy of the meter is the condensation. If the meter could be kept free from condensation, the life of the diaphragm, consequently the accuracy of the meter, would be greatly improved. Just as the heaviest particles that are carried by a stream are deposited where the water is stillest, so are the heavy gases deposited in the meter where the flow is almost inappreciable, and where they are more readily affected by temperature changes. The action of this condensation upon the diaphragm is to wash the oil from it. This is especially noticed where the diaphragm rubs on the side, top or bottom of meter. We find that about ½ of the bad diaphragms have rotted where they came in contact with the tin. The constant rubbing of the diaphragm upon the tin works the condensation into the leather, causing it to rot very rapidly. The first effect of the condensation upon the accuracy of the meter is to cause the diaphragms to shrink, thus making the meter register fast. For this reason almost all meter companies send their meters out about 2 per cent. slow. As the condensation washes the oil from the leathers they become porous, thus bypassing a small amount of gas; but at the same time that the entire leather is becoming porous the action of condensation, where the leather touches the side of the meter, is much more marked. The leather gradually becomes thinner and thinner in these places, until the hole is worn through. When once this hole is through, it gradually enlarges

until, if not repaired, the meter fails to register. The condensation also has a very detrimental effect on that portion of the diaphragm which takes all the bending; *e. g.*, that portion just next to the binding cords. As long as the diaphragm is completely saturated with the condensation one function of the oil, that of keeping the leather pliable, will be fulfilled by the condensation; but, if the temperature of the meter increases enough to evaporate the condensation, after it has washed all the oil from the diaphragm, the leather will become stiff and dry, and will soon crack, just next the binding cords, thus forming a hole through which the company's gas goes free of charge. The third condition (that of change of temperature), one with which I am not very familiar. It is my own opinion, and one that I would like to have refuted or verified by men who know more about it, that the changes in temperature only accelerate the action of condensation. The colder the meter the greater will be the amount of condensation. If the meter is subject to wide changes of temperature, during the cooler times, the condensation will form in the meter and wash the oil from the diaphragms. Then, as the temperature increases, the condensation will be evaporated, thus causing the diaphragm to shrink, the result of which is the meter runs fast until holes form in the diaphragm. Recently we have had 3 or 4 meters come into the shop which tested from 8 to 10 per cent. fast, and upon examining their diaphragms, I found that in each case a comparatively small amount of condensation was present, but that the oil was almost entirely gone from the diaphragm. I would like very much to have this question discussed by parties who are more familiar with it.

The accompanying curve shows the variation of accuracy, with



the quantity of gas passed; the points indicating the curve were determined by testing meters which had passed 18-candle water gas at an average rate of 84 feet per day. Take, for example, the point, 1.6 per cent. +; corresponding to 25,000 feet of gas. This value, 1.6, is the average of 10 tests made on meters which had passed from 20,000 to 25,000 feet of gas. All other points were determined in the same manner. It will be noticed that the curve starts off at 1.5-, that is, 1½ per cent. slow, and rapidly increases to 0.4 +, or $\frac{4}{10}$ of 1 per cent. fast for meters which have passed 5,000 feet of gas. This shows that the action of the gas upon the diaphragm is to make it shrink, thereby causing the meter to run fast. This increase continues very rapidly until it reaches the point 2 per cent. +, corresponding to 35,000 feet of gas. Here the curve starts to drop even more rapidly than it rose, until it reaches the zero point at 50,000, and continues to fall, being .8- at 70,000. Beyond this point the tests varied so much that nothing could be seen from them, so they were omitted. No time element was considered in determining these points.

The question of capacity is not one pertaining so much to the meter as to the appliance to which it supplies gas. However, the meter must be large enough to supply the required amount of gas without having to make an excessive number of revolutions per minute. The life of an overloaded meter, just the same as that of any other overloaded machine, is shorter than that of the normally loaded one. The durability of the meter is always a very important question, and it is an especially important one with us, located as we are in a very salty atmosphere, which causes the meters to rust very rapidly. There are but two ways to overcome this difficulty, viz.: By getting meters which are made of the heaviest material, and by properly protecting them from the weather.

In conclusion, I will give a brief account of what we are doing to the meters in Galveston. Every meter that was set prior to the first of November is to be brought into the shop to be repaired and given a Company number. All 3 or 5-light meters which have passed 50,000 feet of gas or more have the backs and fronts removed so that the diaphragm can be examined. If they are found to contain no holes they are washed out thoroughly with gasoline and then re-oiled with a good diaphragm oil. If the diaphragms have any holes in them they are replaced by new ones. After the diaphragms have been replaced or re-oiled, the valves and valve seats are ground so that they will not leak, and the crankshaft and flagwire stuffing boxes are packed. The back, front and plate are then replaced, and the meter is dipped under water while under a pressure of 10 to 12 inches. If there are any rust holes in the case or holes in the seams, they will be shown by the bubbles which will come from them. When the meter has been made perfectly tight, it is tested for internal leaks as follows: A burner that takes about .5 of a foot of gas per hour is attached to the outlet of the meter. If the tangent makes a complete revolution in 10 or 15 minutes the meter is free from internal leaks. The dial is then replaced, and the meter is sent into the test room to be adjusted. After it has been adjusted, it is topped, badged and painted, and is then ready for service.

The results of this general inspection of all meters have been most satisfactory. While the Company has endeavored to keep the meters in good repair, we found that about 1 per cent. of the meters examined failed to register at all; 2 per cent. registered 50 per cent. or more slow; 5 per cent. were 10 per cent. slow; and 25 per cent. were 5 per cent. slow. Not more than 1 per cent. of them were found to be more than 3 per cent. fast.

The Watt-Hour Meter in Actual Operation.

[Prepared by Mr. O. Brasher for the Last Meeting of the Southwestern Electrical and Gas Association.]

The watt-hour meter, being the instrument which measures the revenue on which the operating company depends for maintenance, it is quite important that it be kept in accurate calibration, for one of the greatest leaks, and consequently of great importance to a central station, occurs in the meter department. Meter losses may be divided into two parts. First: Energy lost in potential circuit and series field, which varies in the different types and makes of meters as well as with different capacities; but, since they are practically constant, will not be considered in this paper. Second: Loss by reason of meters failing to register the full amount of energy which passes through them.

Assuming the meter to run correctly when installed, the loss due to meters becoming slow depends on the type of meter, the load on which it operates and the attention given the meter. As a meter is subject to wear, its natural tendency is to run slow; but sometimes, on account of accident, a meter may run fast. A certain amount of frictional resistance exists in every meter, consisting of the friction of the registering mechanism, friction of the bearings and friction of the brushes on the commutator. The later types of meters have, however, reached such a degree of development that the friction of the registering mechanism is almost negligible unless exposed to excessive dampness or other foreign matter.

To a considerable extent the accuracy of the meter on light load

depends on the condition of the jewel, and the life of the jewel depends—first, on the weight of the moving element and, after the weight is established, on the number of turns of the disk. The permanency of a meter, as compared with meters of similar design, but with lighter moving elements, will bear a definite ratio to the weight of the moving element; hence the wear of the engaging surfaces will be more rapid the greater the weight of the rotating element. And, too, should the meter be subjected to a blow or jar, the injury would be more serious.

In the commutator type of meter the commutator is the weakest point. If the brush tension is too great, friction causes trouble, or if too light, sparking will set up, and this sparking, when once started, increases by the burning and roughening of the commutator until excessive friction is produced, and also results in the shorting of the commutator segments.

Another factor which enters into the continuity of calibration of a meter is the permanency of magnetism in the drag magnets. Although ageing of magnets may in rare instances come in, the most serious change is caused from short circuits on the consumer's mains. A heavy short circuit on the ordinary commutator meter will usually break in the commutator leads, or open the armature, thus causing the meter to run slow on full load and hang on light load. However, the effect of short circuit on magnets is to weaken the magnetism and allow the meter to run fast. Thus, a short circuit on an induction meter will invariably make the meter run fast, since there is no armature to give down. When a sudden excess of current passes through the series coils of motor meters, the series coils become momentarily powerful electromagnets, and may result in varying the strength of the drag magnets. The meters which are in use at present may be classed as commutator type, mercury type and induction type.

The commutator type, as commonly used, consists of the General Electric meter, both the old type and Type C, the Duncan, Westingt house and Scheeffer; each of these has characteristics which are not far different. The Scheeffer, however, is going out, while the Westinghouse is coming into popularity. In the Type C meter the frictional resistance on the commutator is perceptibly reduced by the substitution of a small commutator and narrow brushes. Another excellent feature of this type is that the brushes, instead of being held in contact on the commutator by their own spring tension, are held by counterweighted supports. In this way their pressure is dependent upon the adjustment of the counterweights, which adjustment may be easily varied. While this meter, due to the light weight of the rotating element, as well as to the comparative absence of com mutator friction, will retain its accuracy longer than the older meters with the heavier revolving element, will succumb more quickly when friction does make its appearance. The lower bearing of the Westinghouse direct-current meter, with its cupped sapphire jewels, embracing between them the steel ball, tends to eliminate the wear upon the bearings to a considerable extent.

In case the direct-current mercury motor meter in the latest type has had the defects permanently eliminated which were incident to former productions, as leaking of the mercury chamber and lack of durability of the friction or light load compensating device, a grand revolution in the field of direct current meters has been inaugurated.

In this meter the troubles which are characteristic to other makes, as commutator friction and the wearing of the lower bearings, are done away with: and, too, the fact that this meter is proof from foreign matter, and that it is not necessary to remove case when installing, comes in as a distinct advantage. The alternating current of the mercury motor type has the friction due to the wear of the moving element reduced to a minimum, but time only can decide as to other desirable or objectionable features.

While in the case of the induction type of meter the commutator trouble is eliminated, the other variable factor in the permanency of calibration comes in in due proportion, namely: Weight of the moving element and the resulting wear. Although the rotating element of the induction type is much lighter than that of the commutator meter, there is present a constant vibration or pounding of the armature, produced by the shunt and other fields acting upon it, which tend to injure the bearings sooner or later.

The watt-hour (or energy) meter is required to operate under more varied conditions, conditions in general which are more detrimental to its characteristics than in any other instrument which is used in connection with the central station. It is expected to register from a small per cent. of its rated capacity to 50 or even 100 per cent. overload, regardless of the variation of voltage, frequency and temperature, and is frequently subjected to rough handling and to constant vibration while in service, and must operate for months without attention or supervision of any kind. The manufacturers have met these requirements, and the age of the unreliable electric meter, when reasonable attention is given during service, is past.

For the best results the frequency of testing meters cannot be determined by any fixed rule, as a study of the conditions under which a meter is placed must be taken into consideration—*i. e.*, depending on the type of meter, the capacity, constancy of service and local conditions. In an article recently published a meter expert suggested a period depending on the number of revolutions of the disk, allowing for commutator meters with sapphire jewels 1,000,000 revolutions, and for induction meters 2,000,000 revolutions; but where sapphire jewels are replaced by the cupped diamond jewels, more than 5 times that permissible for a sapphire bearing is a safe limit.

As a matter of personal curiosity, in regard to the comparative accuracy of registration of the commutator and induction meters, 100 cards were selected from the test files of the Brush Electric Light and Power Company, of Galveston, Tex., 50 of these cards representing tests on the direct current type, the other 50 representing tests on the alternating current meters. These cards were taken at random, regardless of make or capacity, or whether "periodic tests," "complaint tests," or "cut-out tests." The time ranged since last inspection from 3 to 10 months, and averaged about 6 months. These meters at previous adjustment were set within 2 per cent. plus or minus, the commutator meters being used exclusively on direct current circuits.

The commutator type showed a registration of 98.3 per cent. on full load and 94.5 per cent. on light load, while the induction meter gave 101.1 per cent. on full load and 100.4 per cent. on light load. The commutator meters consisted of General Electric, both the old type and Type C (the old type, however, equipped with adjustable field coils), the Scheefer and Duncan. The induction type was made up of Westinghouse, Types A, B and C; the Stanley, Fort Wayne Type K, and the General Electric, Type I.

Although the Thomson old type, or Type C meter, will also operate on alternating current circuits, with an error which is due to the inductance of the armature circuit, increasing as the power factor decreases, and for ordinary work almost negligible, yet it is better practice to use commutator meters only on direct current, as all will admit the marked advantage of the induction meter over the commutator type. The commutator meter requires more care, and the cost of maintenance, including labor and repair parts, is, I should say, about 3 times that required for induction meters. In order to secure the best results, commutator meters of large capacity, and those located in the commercial district, should be tested at intervals ranging from 4 to 6 months, while of the resident portion, 6 to 9 months, or even an elapse of 1 year, would not be serious neglect. However, induction meters may safely be allowed to run for 12 months without checking.

Five to 8 commutator meters will, if properly overhauled and calibrated, constitute a day's work for an average man, the number, of course, depending on the capacity and initial condition of the meter; while from 20 to 25 induction meters may be handled by the same amount of effort. But accuracy, not numbers, should be the motto, as no meter should be allowed to go on the line unless in good condition as related to both present accuracy and the probability of maintaining this accuracy for a reasonable length of time. Also the comparative expense of bearings for a large station comes in as somewhat of an item, for it is usually necessary to replace the bearings in the commutator type at each periodic overhauling, while an induction meter may run for 3 or 4 years, or even almost indefinitely, before it becomes necessary to change the bearings for the meter to be capable of performing its duty correctly.

The introduction of high efficiency lamps necessitates that the light load accuracy of meters should become a more important feature, and consequently will throw a greater demand upon the meters and the meter department of the central station. While the meter department is not supposed to have any direct communication with the public, its attitude should be to maintain as harmonious relations between the consumer and the company as possible.

A consumer, on account of the fact that the principle of the meter is not understood, has an inclination to be somewhat dubious as to the accuracy, and constant attention on the part of the operating company will serve to strengthen his confidence both as to the sincerity of the company and the correctness of the meter.

An Apparatus to Test Strong Aqua Ammonia.

Prof. W. C. Klotz, in a note to the *Chemical Engineer*, on this subject, writes: When making tests of the strength of high per centage aqua ammonia by means of a hydrometer, the strong fumes of the liquid are always a nuisance to those nearby, to say nothing of the loss in strength of the sample. A piece of apparatus to obviate these drawbacks, and which is at the same time useful and convenient, can easily be constructed as follows:

A plain, unlipped, glass cylinder, about 2 inches in diameter, and long enough to permit about 3 inches clear space above the top of the hydrometer, when resting in the bottom of it, is supplied with a tightly fitting rubber stopper, perforated with 3 holes, one in the middle and two on the side (Fig. 1). In the middle hole is placed a short, right-angled, glass tube, of small bore, extending just through the stopper. Through one of the side holes is drawn a long glass tube extending to the bottom of the cylinder, where it is bent slightly inward to facilitate the flow of liquid. The upper end is bent at right angles, and is attached to a rubber tube terminating in a glass sampling tube. The rubber tube is of a length sufficient to allow a sample to be drawn from a higher lever than that on which the cylinder stands. The sampling tube should be long enough to reach to the bottom of the bottle or vessel containing the aqua to be tested. In the other side hole is placed a thermometer, extending far enough into the cylinder to obtain the temperature of the aqua at the moment of reading. A 2-valve rubber bulb, to each end of which is attached a short rubber tube, completes the apparatus (Fig. 2).

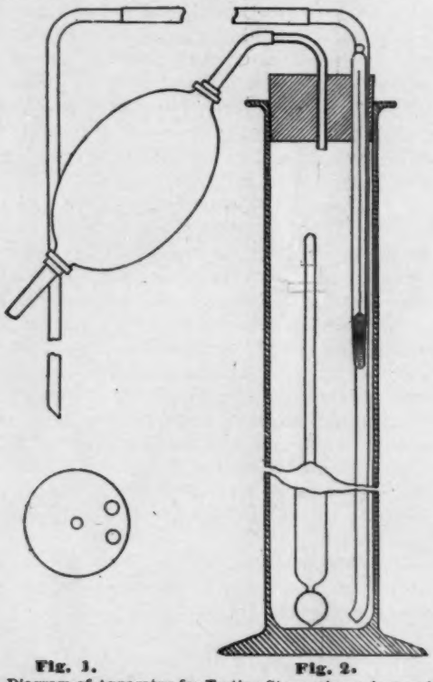


Fig. 1. Fig. 2.

Diagram of Apparatus for Testing Strong Aqua Ammonia.

To make a test, put an accurate hydrometer into the empty cylinder, press the rubber stopper containing the glass tubes and thermometer firmly into place, taking care that the long tube runs down close to the side so that it will not interfere with the motion of the hydrometer. The apparatus must be on a lower level than the container to be sampled. Attach the suction end of the bulb to the middle tube, place the sampling tube in the aqua, and by gentle suction start the siphon, removing the bulb when the flow has commenced. As soon as the hydrometer floats freely, withdraw the sampling tube, and take the temperature and specific gravity readings. To return the sample, attach the pressure end of the bulb to the middle tube, and, by pressing, force the liquid out of the cylinder again. By raising and lowering the sampling tube while the cylinder is filling, a perfectly homogenous sample may be obtained. The small amount of fumes issuing with the air displaced while the ammonia is running into the cylinder is negligible when compared with those encountered in the testing in an open cylinder, and may be trapped if dried. With such an apparatus one can obtain an accurate test of the average contents of an ammonia container, without loss of ammonia, and with practically no odor.

The Mixing of Fireclays.

[By Mr. E. P. Page.]

In the manufacture of firebricks and the great variety of articles made from fireclay many varieties of clays are used, each of which has its own peculiar characteristics. Exigencies of manufacture and the essential properties of the manufactured article often necessitate the use of two or more clays in combination. Further, most measures yield a variety of clays, some of which can be separated when brought to the surface, and manufacturers have to arrange mixtures from considerations of convenience and economy.

There are two methods of mixing, viz., the dry process and the wet process. Dry mixing is effected by grinding the clays together, or by first grinding them separately and afterwards mixing by hand or by machine. The completeness of the mixing will be governed by the fineness of the grinding, assuming, of course, that the clays are properly distributed with regard to each other.

The most efficient and thorough mixing is obtained by the wet process. In this process the clays are "blunged" together, passed over a lawn to take out any still undisintegrated particles, then put through a filter press or allowed to settle. This method is always used in the manufacture of pottery, on account of the evenness and intimacy of the mixtures it gives. In the manufacture of refractory articles the choice of method will depend on the conditions to be filled and on circumstances. The wet process is, however, too expensive except for special work.

The principal reasons for mixing clays are: Modification of the chemical composition, increasing refractoriness under certain conditions, the production of open or close "textures," or the development of certain physical properties. Part of the material may be used in the burnt condition, when it is commonly called "grog," or "chamotte," and other materials may be used, as coke dust, bauxite, graphite, aluminum hydroxide, etc. Also, as suggested in the first paragraph, mixing is sometimes necessary to produce a good working body; *i. e.*, one that will dry and burn without twisting and cracking.

In most cases any admixture which may be contemplated will be expected to increase refractoriness, whether this is the primary object or not. It is, therefore, necessary to consider the properties which characterize refractory clays. Tests of refractoriness are made under standard conditions as far as possible. Whether, under working conditions, the material comes up to the same standard as the clay from which it was made will depend on how far provision has been made for variations between the standard and working conditions. Herein lies the skill of the manufacturer.

The fact is often overlooked that refractoriness is a function of the physical as well as the chemical properties, both of which are definite for any particular clay in its natural state. So soon, however, as heat is applied these properties begin to change, and there is for each clay a temperature at which one or more of its component compounds begins to assume the molten state and to attack and dissolve other compounds in contact with it.

The rate at which the reactions proceed will depend on the temperature and on the character, physical and chemical, of the as yet unaffected constituents. If these reactions can be retarded by any means an increase of refractoriness is gained. An example will make clear this point and others closely allied. Given two clays of which the analyses are as follows:

	I.	II.
SiO_2	52.50	67.18
Al_2O_3	45.21	27.51
Fe_2O_3	0.81	2.52
CaO	....	0.53
MgO	0.54	0.28
Alkalies	0.51	1.90
	99.57	99.92

No. 1 is a hard shale, does not burn dense, is not very plastic and in refractoriness is equal to Seger Cone 36.

No. 2 is a soft clay, which easily weathers, is fairly plastic and is equal to Seger Cone 30 in refractoriness. The problem is to use these two clays in combination to make bricks or furnace lumps (leaving out of consideration crucibles and similar articles). The brick is to be hard and compact in grain, and must resist alterations in temperature without cracking. Neither clay can be used alone. No. 1 is only slightly plastic, and even when ground in a wet pan makes but an indifferent brick.

No. 2 alone is not refractory enough, has too high a shrinkage, burns dense and would crack ("dunt") on cooling. Its most useful property is its binding power.

Proceed by first burning No. 1, then grinding and sieving it to particles graded from ¼ inch to 1/32 inch, the exact limits of size depending on the class of article to be made. None of the fine flour from the grinding should be used. No. 2 (raw) should be ground quite fine. Mixtures may vary from equal parts of each clay to two parts of No. 1 to one part of No. 2, according to the binding power of the latter.

The mixing should be done on a clean floor by spreading the clay in alternate layers and sprinkling with water from a sprinkler or watering can. After the whole batch has been laid down it should be well mixed by shoveling and allowed to stand for a few days, covered with wet cloths to keep the water from evaporating. After turning again with shovels it should be put through a pug mill.

The clay should be quite stiff when molded, and so-called slop molding avoided. This method, rightly carried out, will give a hard, compact, tough body. The brick should be burnt to Cone 10.

Piping for the Steam Plant.

[By Mr. Percival R. Moses.]

The piping of a steam plant may be compared with the arterial system of the body. A break in an artery, unless stopped, produces death, or suspension of the action of the body. A break in a steam piping will not only stop the action of the plant, but probably kill some of the attendants. Piping must be suited to the work it has to do, just as the walls of the arteries must be heavier than the walls of the veins. It must be strong enough to resist the steam pressure and the sudden shocks due to charges of water carried over by fluctuating demands for steam. It must withstand the pressure due to expansion and contraction and must have ample margin to allow for the reduction in strength due to rusting and pitting. The latter requirements are particularly important where the piping carries condensed steam or high temperature water for supplying the boilers, as in these cases the tendency to pit and corrode is active. Some interesting observations on piping, particularly in reference to arrangements for expansion and contraction, were recently made by Percival Robert Moses, a consulting engineer of New York, in a magazine called *The Isolated Plant* and from there is taken the following:

There are three grades of steam piping by thickness—standard weight, extra heavy and double extra heavy. The outside dimensions remain the same, but the wall thickens. Up to 12 in., pipe is rated by the inside diameter; above this by the outside diameter, unless distinctly specified otherwise.

Steam Piping.—For steam, where pressures of 150 lbs. per square inch or less are carried and up to 12 in. diameter, standard weight pipe is amply strong. Above this extra heavy pipe should be used, and where expansion strains are liable to occur, piping of 8 in. diameter and over may be made of extra heavy material.

As between wrought or puddled iron and steel pipe the former is preferable on account of the greater ease of working and because of the reduced liability to pitting and corrosion due to the lessened amount of impurities present. With the improved methods of steel pipe manufacture, the difference in value is disappearing and low carbon steel pipe is about equal to the iron pipe.

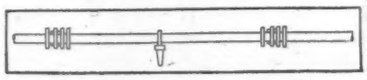
Exhaust piping should be standard weight. The spiral rivited galvanized iron pipe while amply strong for exhaust pressure is not as lasting because of its decreased thickness, and, therefore, except for large work where the piping is of great size, this type of material is rarely to be recommended.

For boiler feed purposes copper or brass piping should be used, as any other pipe will pit out within a few years, and as the labor of installation is always a large proportion of the cost, the extra first cost of the brass or copper piping is soon made up. As between copper and brass, brass has preference on account of lower cost and greater ease of connection. The brass piping should be obtained in "Iron Pipe Sizes," so as to connect with wall fittings and valves. For blow-off piping brass is preferrable, but, in general, because of the low pressure involved beyond the blow-off valve, extra strong iron pipe is used—not for its strength, but because its extra thickness gives longer life.

Standard dimensions of pipe may be found in all mechanical handbooks and in the catalogues of the larger manufacturers, so they need not be repeated here.

Flanges and Fittings.—For all pressures over 100 lbs. per square inch, on pipes over 7-inch, extra heavy cast iron fittings and flanges

Expansion Joint Anchored Close to Joint.



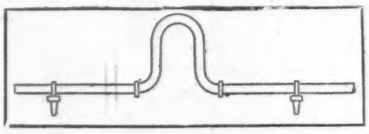
Expansion Joint Anchored Midway Between Joints.

are advisable although not strictly necessary except where great expansion strains occur. A standard weight 8-inch pipe flange will be 1⅛ inch thick, with ⅝-inch belts, while an extra heavy flange will be 1⅜inch thick with ¾-inch bolts. This extra strength is of great benefit in preventing leaks and breakage of pipe lines.

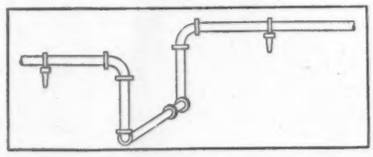
For high pressure work it is often advisable to use on pipes larger than 6-in. the Van Stone or Walmanco joint, made by the Walworth Manufacturing Co., a joint made by flanging the end of the pipe, facing it off in the lathe, and having it brought up against the face of the pipe, to which it connects by an extra heavy loose flange and bolts. This type of joint and the welded flange type require a high degree of care in alignment and measuring up, but when properly installed give perfect results.

For feed pipe extra heavy brass unions should be used wherever it may become necessary to connect or disconnect.

Gaskets.—The variety of gaskets is manifold. For high pressure work Rainbow Usuduarian or similar composition between corrugated copper on either side has given good results; also asbestos with wire



Loop Bent Pipe for Expansion.



Straight Pipe Loop for Expansion.

insertion. Lead gaskets have not proved satisfactory because although they compress as the pipes expand, they do not expand as the pipes contract. For low pressure work any of the good compound gaskets give satisfactory results.

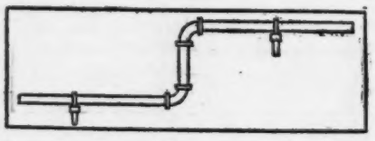
Sizes of Piping.—For boiler connections and for connections from main or separator to engines, a velocity of 25 feet per second is the usual allowance. For high pressure steam mains 100 feet per second and for exhaust steam 25 feet per second is safe, except for very long runs of pipe. The best practice is to keep the main pipe as small as possible without, undue drop in pressure, and then provide receiver capacity at the engines as a local reservoir. This arrangement reduces the first cost of the main and the loss through extra radiation of the larger pipe and also minimizes the objectionable heating of the spaces through which it passes.

For long exhaust pipes the drop in pressure should be calculated, as otherwise the back pressure on the engines may become a serious power waste. This drop may be figured from the formulas given in Kent, or other handbooks, due allowances being made on the one hand for the bends in the pipe and on the other hand because the greatest load usually comes in the heating season when a large part of the exhaust is used in the building and does not pass through the exhaust pipe.

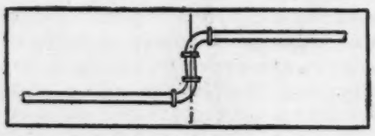
Expansion and Contraction.—The expansion and contraction of

piping may be provided for in several ways. The most important of these are:

A.—An expansion joint inserted in the line, being anchored close to the joint. This method is chiefly used with slip type of expansion joint, where several inches of expansion can be readily taken care of. The object of anchoring close to the joint is to insure the direction of expansion and to hold one end of the joint solidly.



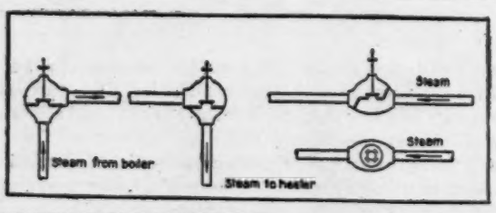
Expansion Spring Piece.



Spring Piece after Expansion.

B.—An expansion joint in the line but anchorage between joints, thus reducing the quantity of expansion. This arrangement is necessary where it is advisable to reduce the amount of expansion at points between expansion joints on account of connections being taken off, but it has the disadvantage of requiring special arrangements for anchoring the pipe against push in two directions, this push occurring in the event of jamming or sticking of the expansion joint at either end. With either of these it is important that the pipes be guided close to the joint, so that the push-and-pull shall be straight. The arrangements shown apply to the corrugated copper expansion joint and the double diaphragm type. The difficulty the author has experienced on high pressure work with both these types is that, if they are strong enough to safely withstand the pressure to which they may be subjected, they become too strong and stiff to expand and contract without undue strain occurring on anchorage points and on connections.

C.—An expansion U-loop of some comparatively flexible material like copper is inserted in the line as indicated. This loop is used very frequently, but it is open to serious objections where any great length of expansion is to be taken care of. The pipes connected by the U must be in practically perfect alignment and the loop must be very long, so that the springing together of the ends of the U may occur without undue strain. This involves extra condensation, extra cost and some substantial method of supporting and guiding



Manner of Placing Valves in Piping.

the U piece. It is satisfactory, however, with moderate expansions up to an inch or an inch and a half, provided care is taken to guide the ends of the pipe and the fittings connecting the pipe to the U take the strain in a straight line. These fittings should be extra heavy and the U piece should have its flange an integral part of the pipe, or at least the ends of the U should be bent to meet the pipes end to end, so that the strain will be direct compression or tension.

D.—Where head room permits, the expansion may be provided for by use of screwed fittings taking the expansion by screwing in and out of the fitting, as indicated, the loop either being run up (preferable) or down. In the former case, the pipes and in the latter the loop, must be drained. For piping up to 8 inches where the expansion is not excessive, this arrangement serves the purpose, but with greater expansion leaks will develop, due to the wearing of the threads, and due to twisting and untwisting action. This method is largely used for taking care of the expansion of heating risers and other compression work, where the tendency to leakage is greatly reduced.

E.—A spring piece is placed in line at right angles to general run. This is very generally used for short expansions. When the spring piece is very long in comparison with the diameter and the amount of expansion is small it works well. It is particularly adapted to short lengths such as connections from boilers into a header or from an overhead main to one underground; where the expansion is great there will almost surely develop a leak at one of the joints as noted on diagram, due to the compression of one side of the filling and tension of the other. Unless the fittings are extra strong with heavy bolts this combined compression and tension will snap the fitting off or crack one of the flanges. To reduce this stress it is usual to install such spring pieces cold and spring in a direction opposite to the expansion, so that when expansion occurs the final position will not be so much out of normal. Each problem has its own best solution, but the point to remember is to try to have the stress one of either direct tension or compression and not a bending strain.

Anchoring and Alignment.—The anchoring must be solid to be of use and where the strain is always one way the pipe may be solidly fastened by a bolt or turnbuckle to a beam or pile. In tunnel work the flange of a pipe or fitting may be allowed to butt up against an I-beam. When the stress may be in either one of several directions, the best method is to use turnbuckles fastened to straps around the fittings. With any method of caring for expansion except D, the matter of alignment is of great importance, as failure to secure it means eccentric strains and with expansion joints either sticking or buckling.

Steam Pipe Covering.—My usual practice in isolated plant installations is to use 2-inch or two thicknesses of 1 inch of the 85 per cent. carbonate of magnesia with 15 per cent. long fiber asbestos, or what is known as fire felt, for all high pressure piping over 4 inches. For high pressure pipes smaller than 4 inches and low pressure pipes larger than 8 inches, I use the standard thicknesses of 85 per cent. magnesia. For low pressure piping 8 inches or less, air cell covering. When the piping is liable to mechanical injury it should be recanvased and sewed with 10-ounce duck. This canvas is sized and painted. Flanges should be covered. A removable flange cover has been placed on the market during the last few years, but its cost makes its application limited and there is always the probability that a serious leak will destroy the flange cover.

Valves.—Globe or angle valves should always be placed so that the closing of the valve will shut the steam off; that is, the valves should close against the steam and the pressure they shut off. Where two valves are installed on a boiler connection, as is good practice, one should close against the boiler pressure and the other against the header pressure, as indicated in one of the sketches. This permits packing easily and preserves the packing—also minimizes leaks around stuffing boxes. It is a very usual mistake to install valves in a different manner and a mistake productive of many leaks in engine rooms.

Where globe valves are installed in horizontal pipes they should be laid on their side, otherwise they will tend to hold water in the piping because of the fact that their seats are above the bottom of the pipe they control. This is indicated in another sketch. Each engineer's practice as to the use of gate and globe valves varies. The gate valve offers less obstruction to the flow of steam, but it is harder to maintain tight. The gate valve is more difficult to open and close unless a by-pass is provided, because of unbalanced pressure existing on one side before opening.

Hints on Piping.—Keep the amount of piping down to the least possible, consistent with reliability and economy. Do not multiply spare connections without real need, but, on the other hand, provide for possible future needs by blank tees and plugged outlets.

Keep the gaskets thin on high pressure work particularly—they are only intended to fill in inequalities and allow a little take-up on expansion and contraction, and anything more than this is a direct invitation to a blow-out.

Have fittings and couplings well on to the threads of the piping.

If a leak develops stop it at once by calking or clamp before it can wear a permanent channel.

Don't make the piping plan rigid—allow amply for expansion and contraction strains and try to have these act along the line of the piping.

Remember that the piping is the most important part of the mechan-

ical equipment; the part on which all other parts depend, and the part most liable to cause labor and trouble unless most carefully studied out. Better to have a poor engine, or a badly designed boiler, than an unsafe system of piping.

[OFFICIAL REPORT.]

FIFTH ANNUAL MEETING, NATURAL GAS ASSOCIATION OF AMERICA.

HELD AT OKLAHOMA CITY, OKLA., MAY 17, 18 AND 19, 1910.

FIRST DAY, TUESDAY, MAY 17.—MORNING SESSION.

The Fifth Annual Meeting of the Natural Gas Association of America convened at the Lee-Huckins Hotel, Oklahoma City, Okla., at 9:30 A.M., May 17, 1910, with Mr. William Hunter McKenzie, of Kansas City, Kas., as President, and Thomas Clive Jones, of Delaware, O., as Secretary. The following members reported their attendance:

ROLL CALL.

Allen, J. F.
Allen, S. S., Jr.
Almert, H.
Ardis, J. B.
Atherton, S. R.
Baker, E. L.
Ballard, C. R.
Ballin, A. E.
Barnes, F.
Barnes. G. W.
Barr, S. H.
Bartley, E. L.
Beach, E. C.
Bendit, L.
Bennett, J. G.
Bigelow, L. S.
Billmek, H. B.
Bishop, H. W., Jr.
Bishop, M. M.
Bixby, W. A.
Bodine, S. T.
Booth, A.
Boothe, G. P.
Braden, G. T.
Brake, J. A.
Branch, H.
Brawley, H. P.
Brendlinger, W. B.
Brummett, J. R.
Bullock, C. L.
Cantrell, C. C.
Carey, J.
Carmody, M. B.
Carpenter, J. F.
Carter, J. H.
Cavenaugh, F.
Cody, A. S.
Cole, T. F.
Connolly, J. S.
Corbett, M. A.
Coyle, F. J.
Cozzins, L. E.
Crahan, B. J.
Craig, C. B.
Curtis, A. G.
Dague, A. B. C.
Dana, J. W.
Davis, H. R.
Dawes, H. M.
Diamond, J. H.
Dibbens, W. J.
Diescher, A. J.
Dings, P. C.
Eakin, R. E.
Emington, P. J.
Evans, G. W.
Ewing, A. M.
Finney, F. F.
Fisher, J. P.
Fithian, E. J.
Foshay, W. B.
Fowks, W.
Freeman, J. W.
Fritz, R. O.
Gage, W. P.
Garard, J. M.
Gavin, T.
Gibson, W. C.
Gillespie, E. A.
Goodrich, H. B.
Grear, W. S.
Greenert, J. A.
Gunn, W. A.
Gwynn, E. F.
Hackstaff, J. D.
Hackstaff, R. C.
Hammon, W. H.
Hampton, W., Jr.
Hardcastle, J. D.
Hartzell, A. C.
Hastings, D.
Hay, R. W.
Hays, V. A.
Henry, W. C., Jr.
Hitchcock, O. G.
Hoagland, H. C.
Holbrook, D. O.
Holmes, A. G.
Holt, W. T.
Hoyt, H. J.
Hunter, S. S.
Jarvis, T. B.
Johnson, A. B.
Johnson, P. R.
Jones, W. H.
Jones, T. C.
Keeton, C. G.
Kelley, H. E.
King, I. W.
LaDow, C. V.
Leamy, A.
Leonard, A. M.
LeFevre, H. E.
Lambert, E. J.
Larkins, J. J.
Lemon, C. W.
Lord, R. S.
Lufkin, E. C.
Macbeth, A. B.
McIlhenny, J. D.
McIlvain, R. W.
McKenzie, W. H.
McLane, O. J.
McLaughlin, H.
Marcus, O. G. F.
Mason, A.
Mason, C. F.
Mettler, L. B.
Mann, J. L.
Miller, F. A.
Miller, H. R. P.
Mitchell, K. M.
Moeller, W., Jr.
Molloy, D. D.
Moore, E. M.
Morris, H. C.
Moss, C. E.
Mueller, F. B.
Neely, F. M.
Nicholson, W. H.
Milson, H. C.
O'Neill, W. D.
Owens, J. F.
Parker, J. F.
Posgate, J. S.
Pratt, J. W.
Raber, H. W.
Rensom, J. H.
Rhea, E. B.
Robinson, F.
Robinson, G. R.
Robinson, G. W.
Schall, H. D.
Schell, G. W.
Sears, C. W.
Seeger, R.
Seidenglanz, C. H.
Shaunon, O. K.
Shreve, J. H.
Shryock, G. A.
Sipe, G. B.
Small, H. G.
Sprague, H. H.
Stanford, G. T.
Stevenson, B.
Stone, F. W.
Storm, J. C.
Strickler, J. P.
Strickler, W. W.
Stuchell, F. L.
Sybrandt, J. L.
Sweetman, M. M.
Swift, J. R.
Tadball, J. W.
Tidnam, F. H.
Tippy, C. W.
Tewsksbury, J. P.
Townsend, C.
Treleaven, L. G.
Van Blarcom, H.
Van Sickel, C.
Van Sickel, W. S.
Walker, E.
Wallace, R. D.
Walsh, M. W.
Welch, W. M.
Weisgerber, E. C.
Westcott, H. P.
Whitehead, L. K.
Willey, C. L.
Willoughby, H.
Witman, W. S.
Wittmer, G. X.
Wittmer, T.
Wittmer, X.
Wood, W. L., Jr.
Worth, S. S.

The President—Gentlemen, we will now consider the fifth annual meeting of the Natural Gas Association of America in session and ready for business. Our first feature will be an address of welcome from Honorable Mayor Scales.

ADDRESS OF WELCOME.

Mr. President and Gentlemen: It certainly affords me a great deal of pleasure to have the privilege of standing here this morning and, in behalf of my city and as its chief executive, to try, in very feeble and halting way, to extend to you a few words of really genuine, hearty welcome into this the newest city and, in some respects, the most wonderful town in the United States. Unfortunately, your speaker is suffering with a physical infirmity that makes articulation extremely difficult, which causes my words to halt and probably not to be thoroughly understood, but, out of the fullness of my heart, I yet hope to be able to say something that may assure you of the fact that we appreciate your presence here on the plains of Oklahoma, this, the 17th day of May, 1910. Our hearts were filled with both pleasure and pride when last year the news came flashing over the wire, from Columbus, O., that this city had been chosen as the next Mecca in which this representative body of men would gather. Being the largest city within the new State, it naturally follows that many conventions or gatherings take place within our confines. So much has that been true in the past, in a small way at least, we are recognized as the convention city of Oklahoma. I seriously question if ever this city has had the privilege of entertaining in convention a body of men, because of the line of business they are in, so significant as this gathering. The natural gas industry is so fundamentally connected with progress, with building, with expansion, with growth, with those material things that go to make up the possibilities of a city, that we recognize and realize that in you and through you and by you, the wheels are made to turn, the factories are made to multiply, that products are made to come forth, that wealth is increased, that cities are builded. We are not unmindful nor unappreciative of the fact that through the gas company of this city what we have already done has been made possible, and we know that what has been accomplished is only an earnest of those things that are yet to be accomplished, or made possible, by reason of the fact that we are of the few cities with the proud privilege of having a natural gas supply. Time was, to digress but a moment, when it was necessary for cities to wall themselves in with strong and impregnable fortresses. At that time it was also necessary that gates guard the city, and that only those to whom the keys were given were allowed to come and go at their liberty and at their will. It is a very far cry from walled cities to building a town like this; but it was the custom then, when any visitors did come into the midst of another city, that the keys of the city should be literally handed to them as indicative of the fact that they were friends and had the right to come and go at their pleasure. Because of that historic fact, it has become a custom that, when conventions do come, keys are, at least figuratively, offered. Carrying out that idea, which is really a beautiful one in sentiment, I have the pleasure on this occasion to turn over, not only figuratively but literally, the key of our city, Mr. President, to the Natural Gas Association of America, and all we ask is that you may leave the town approximately in the same condition in which you found it, because some of us may have use for it next week. [Prolonged applause.] Besides that, you are more than welcome. We appreciate your presence. We are glad to look into your eyes and to strike hands with you, to know you, to understand you, because we believe if we succeed in making a favorable impression upon this body of men that, when you go back to your respective homes, you will not fail to mention our town to others and thereby assist in giving to us that publicity which has builded us to our present point; and we are not figuring, gentlemen, on stopping anywhere short of 200,000 or 300,000 people. Therefore, we want your assistance, your co-operation, your friendship. Again, on behalf of the city, I welcome you in our midst. [Applause.]

Thereupon, the Mayor, suiting the action to the word, "literally, not figuratively" presented to the President a large and perfectly burnished key, incased in a handsome leather case lined with silk.

RESPONSE BY MR. GARARD.

The President—We have with us to-day Mr. J. M. Garard, who is here to tell the Mayor of Oklahoma City and the people of Oklahoma how glad we are to be in their midst. Mr. Garard.

Mr. John M. Garard, responding, said: Mr. President, His Honor the Mayor, Gentlemen of the Convention—The Mayor said he was going to do his part in a weak way, and I am sorry he didn't wait until I got through; but to me has been assigned one of the most pleasant duties of our present meeting, that of accepting, on behalf of the Natural Gas Association of America, the key to the Sunbeam City of the great Southwest. When a letter from His Honor, the

Mayor of Oklahoma City, was read in our convention hall at Columbus, O., at our last annual meeting of this Association, it was unanimously decided that we not only wanted to meet that Mayor, but we wanted to meet the people whom he represented, and, while other cities were mentioned as the next meeting place, their claims were not considered. Since that time our greatest efforts have been put forth to make the natural gas convention at Oklahoma City the greatest in the history of the Association; and, from present indications, we are about to realize our fondest expectations, for at no time have the members shown such profound interest in a meeting as they have in this. Right here I want to say that our President and Secretary should be given great credit for bringing about present conditions.

And now to the honorable gentleman who have so kindly opened the portals of this City Beautiful to the members of the Natural Gas Association, in behalf of its members, I beg to thank you for your generous welcome, and in return for your kind hospitality I promise that the golden key to your charming homes will be taken with us at the close of this meeting without one spot on its polished surface; and I am sure at no time in the future will the residents of Oklahoma City have cause to regret that they entertained the members of the Natural Gas Association of America on this, their Fifth Annual Meeting.

It is hard to realize that you have just attained your majority, for you have certainly built far beyond your years, and it is not my intention to take from you one particle of credit for what you have done in the way of building the many beautiful homes and magnificent business blocks, but the Supreme Being was certainly kind to you when He furnished the foundations and surrounded them with a Garden of Eden. I thank you very much, gentlemen. [Applause.]

The President—The next order of business is the reading of the minutes of the last meeting.

In Memoriam.

Mr. Sweetman—Before you go into the general business of the meeting, and take up the reading of papers and reading of the minutes, I want to call attentton to the death of one of our esteemed members since the last meeting, Mr. James B. McGowan, of Kansas City; and, if you will permil me, I would like to offer a resolution.

The President—Certainly; proceed.

Mr. Sweetman—*Whereas*, Since the last annual meeting of this Association death has removed from our roll the name of one of our most esteemed members, Mr. James B. McGowan, of Kansas City, Mo.; and,

Whereas, His fellow members of the Natural Gas Association of America desire to record their appreciation of the high character of their late associate and to express their regret concerning his demise; Be it, therefore,

Resolved, That the decease of Mr. McGowan deprives this organization of one of its most valued members. Always deeply interested in the proceedings of our conventions, he by his modesty, geniality and unvarying courtesy, gained the friendship of every member of this body, whose intercourse with him is pleasantly remembered. The feelings of regret which his demise occasions us are united with our sympathies for his widow and relatives, who are bereft of a kind and affectionate husband and friend, while the community of Kansas City suffers the loss of one of its best and most useful citizens.

Resolved, That these resolutions be spread on the minutes, and that a copy be sent to the family of the deceased.

On motion the resolutions as read were adopted by a standing vote.

The President—We will proceed, as I have said, with the reading of the minutes of the last meeting.

On motion of Mr. L. S. Bigelow the reading of minutes of the last meeting was dispensed with.

The President called for the

Report of the Board of Directors,

which the Secretary read as follows:

Oklahoma City, May 16, 1910.

To the Natural Gas Associatisn of America: Gentlemen—Your Board of Directors begs leave to submit for your consideration the following recommendations and report:

Membership Committee.—James P. Strickler, K. M. Mitchell, W. M. Welch.

Auditing Committee.—John M. Garard, K. M. Mitchell, W. M. Welch.

Nominating Commitee.—John F. Parker, W. M. Welch, K. M. Mitchell.

Committee on Next Place of Meeting.—D. O. Holbrook, A. B. Macbeth, H. P. Brawley.

Committee on Final Resolutions.—L. S. Bigelow, Alan Lemay, C. W. Sears.

That Messrs. C. T. Chisholm, R. C. Cornish, W. P. Benedict, Lee H. Wilson, S. S. Stratton, J. L. Maloney, M. H. Gascoigne, J. W. Freeman, B. L. Love, W. A. Lapham, Isidor Rauh, E. H. Becker and C. H. Apple be released from membership, at their own request.

That Messrs. (the report mentioned 5 names) be dropped from membership, for non-payment of dues.

That the 37 associate members elected at the Fourth Annual Meeting, be placed in the active class.

That the following changes be made in the Constitution and By-laws:

Amendments to the Constitution.

That Article 4, Section 2, be amended to read as follows: The Board of Directors shall consist of the President, the Vice-President, the Secretary-Treasurer and 4 active members of the Association, two of whom shall be elected at each annual meeting and whose term of office shall be for 2 years.

That Article 3, Section 1, 2 and 3, be amended to read as follows:

Section 1. The membership of the Association shall consist of Honorary, Active and Junior Members, and Junior Members shall not be entitled to vote nor hold office, but shall be entitled to all the other privileges of membership.

Sec. 2. Honorary Members shall be gentlemen whose scientific or practical knowledge in matters relating to the gas industry, and whose efforts and interest in behalf of said industry shall recommend them to the Association.

Sec. 3. To be eligible for Active Membership, a person must be an officer or employee of a gas company, or be engaged in an occupation identifying him with the gas industry, or be otherwise qualified to assist in promoting the objects of the Association.

Sec. 4. To be eligible to Junior Membership, a person must be directly or indirectly connected with the gas industry, or may be skilled therein. Junior Members shall have all the privileges and courtesies of the Association, except the right to vote or hold office. Junior Members may be transferred to Active Membership by a vote of the Association upon recommendation of the Board of Directors.

Sec. 5. Honorary Members shall be proposed by the Board of Directors, at a general meeting of the Association.

Amendment to the By-Laws.

That Article 3, Section 1, be amended to read as follows: The fees for Active Members shall be $5, which shall include dues for the first year, and the yearly dues shall be $5, payable in advance thereafter. The fees for Junior Membership shall be $3, which shall include dues for the first year, and the yearly dues shall be $3, payable in advance thereafter.

Respectfully submitted for the Board of Directors.

W. H. McKenzie, President.
T. C. Jones, Secretary.

Mr. Sweetman—I would like to ask if this means that junior members hereafter shall not be entitled to election as active members?

The Secretary—The junior members remain as they are. This simply allows the associate members to come in as active members. Heretofore, it has been the custom to elect the associate members to active membership a year after they have been in. The junior members remain as they now are.

Mr. Sweetman—It doesn't affect those who have been elected heretofore?

The Secretary—No, sir.

Thereupon a motion to adopt the report of the Board of Directors was put and unanimously carried.

Report of the Secretary-Treasurer.

Secretary-Treesurer Jones now read his report, as follows:

To the Natural Gas Association of America—I have the honor to present herewith the Annual Report of the Secretary and Treasurer for the period between May 17, 1909, and May 1, 1910.

Membership Report.

Honorary:		
As per membership rolls May 19, 1908		2
Elected May 18, 1909		2
Total		4
Active:		
As per membership rolls May 19, 1908		202
Transferred from associate, May 18, 1909		19
Elected May 18, 1909		103
		324
Resigned May 18, 1909	6	
Died during the year	3	9
Total		315
Associate:		
Elected May 18, 1909		37
Total		37
Junior:		
As per membership rolls May 19, 1908		23
Total		23
Total membership this date		379

Financial Report.

Receipts:	
Balance, May 18, 1909	$390.00
Dues	968.00
Initiation fees	650.00
Sales of proceedings	30.00
Advertising	675.00
Gas Journals, report Fourth Annual Meeting	45.00
J. F. Owens, Secretary	429.25
Total	$3,187.25
Expenditures:	
Printing and stationery	$1,438.74
Reporting, Fourth Annual Meeting	120.00
T. C. Jones, compensation as Acting Secretary	150.00
Postage, express and general expenses	340.73
Clerical assistance	42.05
Balance, in Delaware Savings Bank	1,095.73
Total	$3,187.25

Respectfully submitted,

T. C. Jones,
Secretary and Treasurer.

The Auditing Committee's report certified to the correctness of the accounts and statements submitted by Secy.-Treas. Jones, and the reports were ordered received and filed, on motion of Mr. Bigelow.

Mr. Welch—I believe that the successful showing made is due largely to the officers, particularly our Secretary and Treasurer. I move a vote of thanks be extended to him for his very successful and surely untiring efforts. [A score of seconds.]

The President—You have heard the motion by Mr. Welch. [There were no "Noes."]

Election of New Members.

Next in order is the consideration of applications for membership and balloting.

Thereupon the Secretary presented the names of the following applicants for membership:

Ards, J. B., Shreveport, La.
Beach, E. C., Little Rock, Ark.
Bodine, S. T., Philadelphia, Pa.
Booth, A., Pittsburgh, Pa.
Braden, G. T., Pittsburgh, Pa.
Brake, J. A., Fort Smith, Ark.
Brendlinger, W. B., Pittsburgh, Pa.
Brundrett, J. R., Henrietta, Tex.
Byrnes, P. V., Hamilton, Ontario.
Cantrell, C. C., Sapulpa, Okla.
Cavenaugh, F., Chicago, Ills.
Chaplin, W. G., Pittsburgh, Pa.
Cody, A. S., New York City.
Cole, T. F., Pittsburg, Kas.
Corbett, M. A., Columbus, O.
Crahan, B. J., Joplin, Mo.
Crawford, G. W., Pittsburgh, Pa.
Curran, G. W., Philadelphia, Pa.
Dana, J. W., Kansas City, Kas.
Dawes, B. G., Marietta, O.
Dawes, H. M., Chicago, Ills.
Dings, P. C., Ardmore, Okla.
Dittman, C. E., Waynesburg, Pa.
Dolan, T., Philadelphia, Pa.
Ellis, W., Houston, Tex.
Evans, G. W., Dallas, Tex.
Finney, F. F., Bartlesville, Okla.
Fisher, J. P., Kansas City, Mo.
Fithian, E. J., Grove City, Pa.
Foshay, W. B., Wichita, Kas.
Fulton, L. B., Pittsburgh, Pa.
Gage, W. P., Fort Worth, Tex.
Gibson, W. C., Wichita Falls, Tex.
Goff, G. S., Corning, N. Y.
Goodrich, H. B., Ardmore, Okla.
Hackstaff, R. C., Pittsburgh, Pa.
Hare, C. W., Philadelphia, Pa.
Hampton, W., Jr., Bowie, Tex.
Hanshaw, E. M., Indianapolis, Ind.
Hardcastle, J. D., St. Louis, Mo.
Hastings, D., Tulsa, Okla.
Harper, J. D., Dallas, Tex.
Holt, W. T., Kansas City, Me.
Hunter, S. S., Shreveport, La.
James, R. C., Philadelphia, Pa.
Johnson, A. B., St. Louis, Mo.
Keeton, C. G., Kansas City, Mo.
LaDow, C. V., Fredonia, Kas.
Lambert, E. J., Independence, Kas.
Larkin, J. J., Bartlesville, Okla.
Lathrop, A. P., New York City.
Lufkin, E. C., Fort Worth, Tex.
McCloskey, J. P., Huntington, W. Va.
McIlvain, R. W., Shreveport, La.
McIlhenny, J. D., Norristown, Pa.
McKee, W., Pittsburgh, Pa.
McMillin, E., New York City.
Miller B. M., Fort Worth, Tex.
Morgan, R., Philadelphia, Pa.
Morris, H. C., Dallas, Tex.
Moore, E. M., Pittsburgh, Pa.
Neely, F. M., Independence, Kas.
Nicholson, W. H., Erie, Pa.
Northrup, J. D., Cumberland, Md.
O'Neill, W. D., Tulsa, Okla.
Pratt, J. W., Chanute, Kas.
Price, P. J., St. Catherines, Ont.
Posgate, J. S., Independence, Kas.
Pyzel, E. D., Amsterdam, Holland.
Reeser, H. C., Pittsburgh, Pa.
Rhea, E. B., Kansas City, Mo.
Reynolds, M. G., Anderson, Ind.
Robinson, F., Casey, Ills.
Robinson, G., Independence, Kas.
Robinson, G. W., St. Louis, Mo.
Schall, H. D., Chicago, Ills.
Schall, G. W., Howard, O.
Seidenglanz, C. H., Kansas City, Mo.
Shannon, O. K., Fort Worth, Tex.
Shiebler, M., New York City.
Small, H. G., Independence, Kas.
Sprague, H. H., Bridgeport, Conn.
Stanford, S. T., Independence, Kas.
Stewart, S. B., Pittsburgh, Pa.
Strickler, W. W., Muskogee, Okla.
Storm, J. C., Amarillo, Tex.
Sybrandt, J. L., Kansas City, Mo.
Tadball, J. W., Norwood, O.
Tidnam, F. H., Oklahoma City, Okla.
Tippey, C. W., Dallas, Tex.
Thompson, P., Philadelphia, Pa.
Van Sickel, C. V., Fort Smith, Ark.
Van Sickel, W. S., Fort Smith, Ark.
Weisgerber, E. C., Zanesville, O.
Willey, C. L., Independence, Kas.
Wittmer, F., Pittsburgh, Pa.

On motion of Mr. Bigelow the Secretary was authorized to cast the ballot of the Association in favor of the election to membership of the gentlemen named, and he subsequently reported that he had acted in accordance with the suggestion.

At this point Vice President Gerard assumed the Chair and President McKenzie delivered the following

INAUGURAL ADDRESS.

There are so many good things planned for this meeting that I feel our time will be pretty well taken up. However, there are a few live subjects which I should like to bring before you briefly.

In my opinion—and I think it is also the opinion of a great many here—there are certain matters pertaining to the natural gas business which should be kept alive, and in some way discussed at every meeting of the Association. These subjects should never cease to receive our attention, nor will they if we often discuss them; let us never be satisfied to allow them to drop out of sight.

I am sorry I cannot here express my views on these matters directly to those of our co-workers who are not present with us to-day, but as these remarks will be embodied in the minutes of the meeting, which are open for their inspection and will be printed in the Journals, I trust those absent will derive benefits from these suggestions which I offer as the results of my own experience.

In the first place, are we as managers, superintendents and heads of departments of the different corporations by which we are employed, doing our full duty? Unquestionably, we are at all times on the alert, and very careful in giving our employees instructions on lines of economy and good service and courteous treatment to the public; but I am afraid we are neglecting a very important part of their education, which is on the line of their loyalty to their employer.

From whom do we, with thousands and thousands of others, derive our livelihood? I have no way of telling those of you before us to-day who are working for corporations, or who are individual owners and who are employing help. Be that as it may, I think my remarks will apply to one as well as to the other.

To-day, in dealing with the public, the corporation is being subjected to undue and unfair criticism, and I, as one having been practically all his life employed by different corporations, think the time has come when the tide of public opinion should turn. I am also of the opinion that we who are reaping the benefits from these same corporations should be the ones who should endeavor to change this sentiment. I have observed that the public has not only the employer but the employee badly bluffed. I think I can demonstrate this point. Let a man who is employed by a corporation meet 2, 3 or 4, maybe 6 citizens, and in the course of the conversation it happens his company is mentioned, as it is pretty sure to be. He will silently disclaim and allow the opposition to go unanswered; or, if he opens his mouth, it will be to acquiesce in what the others say, rather than to express an individual opinion. I think it the duty of every man working for a corporation or individual owner to uphold that company or individual at any and all times, and if he cannot conscientiously do so he should not impose upon them by taking money for work which at best is half-hearted and half done. I maintain that the employee who is not loyal to his employer cannot do full justice to either his work or his employer. I also think, if a man is not satisfied either with em-

ployer or conditions, he should make his grievance known in a business-like way and give his employer the opportunity to state his attitude in the matter. Then, if they cannot come to an amicable settlement, let him quit them on good terms and look for that employment elsewhere suitable to his particular case. In the future, if opportunity warrants, he need never feel any delicacy in asking these same people for another position, and they in turn will have no hesitancy in re-employing him, generally on better terms than before. I daresay there is not a member of this Association to-day, employed by corporation or individual, who, if he were to resign his position, no matter under what conditions, could conscientiously say one word detrimental to his employer. I tell you, if the employee will sit down and think this matter over carefully and give his employer the same consideration that the employer gives him, it will not take him long to make up his mind that his station as an employee is not so bad after all, and instead of eternally complaining of his condition, never missing an opportunity to abuse the corporation, will soon realize the necessity of a change of tactics. Then he will take the other course and find it to his advantage to speak for, not against, and try to give the public some of the real facts in the case, thus making an honest effort to be true to his duty and to the corporation from which he draws his salary. As one who has worked for corporations all his life, I can earnestly say that all they require from the public or the employee is a square deal, and they are always ready to give the same in return; and we, who enjoy the confidence and know the loyalty of our corporations, should make an honest effort at any and all times to bring about this change in public sentiment.

Just a word or two in regard to the manufacture of appliances. I want it understood, right at the start, it is not my intention to rap anyone for what he has done. Instead, I want to have a heart-to-heart talk with the appliance men in order that we may all understand what we will have to come to in the future. I want to say that in my opinion the day has passed when we can put on the market any old appliance, saying to the consumer that this or that article is as good as anything you can find for your heating purposes, with an economical consumption of gas. I think you all realize, and have for some time, that we have been selling natural gas at a rate too low per 1,000, and that we will all commence sooner or later to raise the price of our comodity. When we do, there is going to be a demand right there for the appliance that will be the most economical in the consumption of gas and yield the best results for the least fuel consumed. I think from now on we will all have to put our best efforts forward to accomplish these ends; and we might as well realize these facts right now, for the time is at hand and, just as sure as I am talking to-day, the manufacturer who realizes this condition first, and commencing to put the better appliances on the market is the one that will win out. Now the fact is—and I think you will all bear me out in this—that since natural gas has been introduced in a great many communities the price of other fuels has not been cheapened at all. It has been my experience that natural gas at 25 cents per 1,000 will just about break even with the prevailing price of coal, when you put it to use for heating purposes; and it is a fact, as you all know, that we can only guarantee a given B.T.U. for every 1,000 cubic feet of gas. You might still use the old saying: "Well; we can sell all the gas for domestic consumption we can get, for people will be willing to pay from 25 to 30 per cent. more for gas than they would pay for coal, on account of the convenience and cleanliness of the former." Well; that has proven so, to a certain extent, in the time we have been selling gas at the low price that prevailed; but when we are compelled to raise the price, for one reason or another, and this increased price is very much higher than coal, we cannot assume that we will sell as much of our gas for the reason of its being cleaner and more convenient, as we have in the past. We have only a small percentage of consumers on our books who can afford to take these conditions into consideration; therefore, it will fall on these manufacturers, as I have said, if they want to keep their goods on the market, to make an article that will insure the consumer an efficient and economical means of using our product for their domestic use in the heating of their homes.

There are a few thoughts that occur to me in regard to the illuminating end of our business. I have no means of telling how many of you gentlemen that are now managing natural gas situations have ever managed a manufacturing gas property; but, I for one, who had both to contend with, cannot help but think we are while in the natural gas business making a great mistake by not paying more attention to the lighting end of our business. I can remember when we were distributing manufactured gas, that we had to be on the lookout at all times, in order that the other fellow did not slip in and take our customers away from us and substitute his product for ours for illuminating purposes. At that time all the argument necessary for him to make was that his product was easier to handle and was more attractive and ornamental. Therefore, I contend we may some time be put to a much larger expense to get this end of our business worked up again than it could possibly cost us at this time to follow it up and keep all of it we can. We have a much better chance at this age than we ever did to do this; for while it is not necessary to take into consideration the cost between our product and any other, we have conditions improved to such an extent that we can meet the other fellow with his old argument of attractiveness and convenience. For it can hardly be said to-day that we cannot produce the same effect, and I don't know but that it might be said we can even do better, when we take into consideration the improvements made in the last few years in appliances for the use of gas for illumination, adding to its quality. Doesn't it seem queer to you, when you give this matter your sober thought, that, at the cost we are selling our produce, there would be any other agency employed in our cities for producing illumination? Can you tell why this is? I can. It is because we are not paying as much attention to this branch of the business as we should; and my purpose is to call your attention to this condition, to get you to thinking, and at our next meeting, or at this meeting, get your expression on the subject, for, as I have said, and I want to emphasize that we will some day see our mistake if we do not commence soon to correct the condition. I imagine that a good many of us will say we cannot make any profit on this branch of the business. Well, suppose we grant that; but we won't grant that we could do worse than break even. Suppose we do not make a profit, and only, as I have said, break even, we will have our business that is so desirable, and will not be called upon to expend a large amount in order to regain it at I am sure a big loss for some time before we could commence showing a profit.

Liberal applause followed the delivery of the President's address, and the Vice-President appointed Messrs. L. S. Bigelow, S. S. Allen and K. M. Mitchell a committee to consider its findings, the committee being instructed to report the same at a later session.

The President, resuming the chair, announced the next order of business was Reports of Standing Committees, and asked Mr. Mitchell, from the committee appointed last year, to report on the selection of an official badge.

Mr. Bigelow—I will have to ask the indulgence of the meeting. The committee has not gotten together yet.

The President—Very well. Next in order come Reports from Special Committees. Has the Chairman on Entertainment any announcement to make?

Mr. Walsh—Among other things, a most excellent exhibit of natural gas appliances and utilities is on display and for inspection at Oklahoma City's spacious Auditorium, from 10 A. M. to 10 P. M. each day; Big Chief Quanah Parker and his tribe of Comanche Indians are ready to give the regulation war dance, as seen on the Indian reservation; they may be seen each day and night of the convention; plenty of music; an automobile ride, seeing Oklahoma City and natural parks on 26 miles of Boulevard; entertainment at the Open Air Theater; the Oklahoma City Fire Department exhibiting their celebrated 14-horse street hitch; the banquet to be held at the Lee-Huckins Hotel, and proceeded to announce many other entertainments and courtesies to be extended to the Association, each of which unfoldings was greeted with applause.

Mr. Garard—It may be a trifle early, but I think many members of this Association know how Mr. Walsh has labored for the success of this meeting, and I would like to have an expression of the gratitude I know we all feel for the manner in which he has planned and arranged for our instruction and entertainment, and let it be by a standing vote.

The President—Gentlemen, all stand. I know you will. [And all did.]

Messages of Regret.

The President—The Secretary has several telegrams and letters he would like to read.

The Secretary then read telegrams. From Governor Harmon, of Ohio: "Remembrance of last year makes me sorry I am not with you now. Oklahoma will make you all grow." [Applause.]

From U. S. Senator from Oklahoma, Thomas P. Gore: "Regret exceedingly official duties render it impossible for me to be present."

From U. S. Senator from Oklahoma, Robert L. Owen: "My duties

will make it impossible for me to attend the Association meeting May 17th, 18th and 19th."

From ex-President of the Association, Mr. J. C. McDowell: "Please express to convention my sincere regret that I cannot be with you this session. I fully intended to be with you until last moment, when I was compelled to change my plans. Please request George W. Barnes to read my paper on 'Conservation of Natural Gas.'"

From P. W. Lupher, of Columbus, O.: "Sickness has robbed me of a pleasure that I look forward to each year, and I regret very much that I cannot be in attendance at the convention. I shall miss the handshakes, and wish you would express my heartfelt regrets."

Letters from Messrs. Walton Clark, Philadelphia; C. B. Strohn, Illinois Gas Association; A. P. Lathrop, New York City; Irvin Butterworth, Detroit, Mich.; A. B. Beadle, American Gas Institute, New York; Joseph F. Guffey, Philadelphia Company, Pittsburgh; E. C. Brown, New York City; Samuel T. Bodine and Arthur H. Huey.

Mr. Bigelow—I understand that Mr. Dunkel, who was to have read a paper at this meeting, is quite ill. I move you, sir, that a telegram of sympathy be sent to Mr. Dunkel by this Association. [Unanimously adopted.]

The President—The Secretary will prepare a message.

Later the following telegram was prepared and sent to Mr. Dunkel at Lawrence, Kas.: "Exceedingly regret it is impossible for you to be with us. Best wishes for a speedy recovery.—NATURAL GAS ASSOCIATION OF AMERICA."

Thereupon, after the transaction of further routine business, at the suggestion of M. W. Walsh, Chairman of the Entertainment Committee, and by general consent, all officers and delegates formed in line and marched in a body to the Auditorium to inspect the exhibits and enjoy the entertainments.

(To be Continued.)

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

958,725. Pressure Regulator for Gas Plants. F. L. Cross, Detroit, Mich.

959,090. Safety Gas Cock. Edward Van Wickle, New York City.

959,244. Gas Burner. B. E. Meacham, Lorain, O., assignor to American Stove Company, St. Louis, Mo.

959,324. Gas-Making Apparatus. P. A. Emanuel, Aiken, S. C.

959,343. Gas Burner or Heater. C. F. Holtmann, Pittsburg, Pa., assignor of three-fifths to Stewart C. Gailey, Wilkinsburg, Pa.

959,397. Gas Controlling Device. W. C. Simmons, Gassaway, W. Va.

Items of Interest
FROM VARIOUS LOCALITIES.

It is quite certain that Pemberton, N. J., is to have a gas plant, whether of the acetylene type, or other and safer sort, has not been definitely determined.

"DEAR JOURNAL: Some time ago you printed the fact that Mr. B. W. Perkins, otherwise known as 'Our Ben.,' had resigned his berth in this high-up city (Altoona, Pa.), to take engineering charge of the Hartford City (Conn.) Gas Light Company. In that mention you had a kind word or two to say about him—of course, any mention that anyone might have to make about him must necessarily be made in kindly vein—so, to complete the chain of evidence respecting that which we think of him in Altoona, I submit the following which was recently published in the Altoona *Mirror*: "*Mirror* readers may recall an editorial we printed some time ago about the hospitalitiy and brotherly kindness of Altoonans, and how these unnamed assets appealed to visitors within our gates. We mention the experiences of one man, who came out of the West with a smiling face and outstretched hand, and was received with open arms and made to feel right at home. That man was Mr. B. W. Perkins, Manager of the Altoona Gas Company. If we mention it now it is for the purpose of adding that he is going to leave us after a stay of four years. He has been promoted to the position of General Manager of the Gas Works, Hartford, Conn., owned by the same company as the Altoona plant. Mr. Perkins is a versatile genius. He knows the gas business from alpha to omega. He understands human nature because he loves every man as a brother, sympathizes with him and overlooks his weaknesses and foibles. He has an affinity for men who are doing things, because he is doing things himself; the practical and æsthetic appeal to him, and whatever is good and beautiful for humanity has his hearty support. His fine abilities were never put to a stronger test than when he came to Altoona. He found the public hostile to his Company. He set about a harmony errand, and by his own herculean efforts re-established those general features that are for the best interests of all. The *Mirror* is going to see Mr. Perkins leave Altoona. He is the kind of citizen of whom we can never get enough. But we are glad to have had him with us even for a little while. He takes with him the best wishes of a host of friends."

"W. R. MCKINNEY, formerly of the Lincoln (Neb.) Gas and Electric Light Company, was installed new business manager of the Gage County Gas Light and Power Company at Beatrice (Neb.) May 16th, where he will try to educate the natives to use the best of fuel on earth—Gas. Mr. J. J. Hewitt has been General Manager here for 3 years, during which period he has had great success—C. R. W."

MR. W. I. BATTIN has been appointed Engineer to the Indiana Lighting Company, with headquarters at LaFayette, Ind. Mr. Battin's prior record made in the People's Gas Light and Coke Company, of Chicago, rather guarantees that the Indiana Lighting Company made a very good choice in selecting Mr. Battin as its engineering leader.

A "VETERAN GAS ENGINEER," writing to us from Butte, Mont., under date of the 26th ult., says:

"DEAR JOURNAL: You see I'm on the West of the Rockies now. To-day I made an inspection of the local gas works, under guidance of the Superintendent, my old-time friend F. C. Kniese, than whom it would be hard to find a more all-round, experienced, practical gas man anywhere. Coal gas is made here, and also have one of the Western Gas Construction Company's 4-foot water gas apparatus, in a corner of the works—not in use, though, as oil costs 16 cents per gallon. But it would open the eyes of many a gas manager to see how Mr. Kniese handles his tar. Instead of giving it away for 2 to 3 cents per gallon, he has rigged up a home-made, but perfect tar still, in which he manufactures a paint for which he gets 60 cents per gallon; shingle stain, at same price; 'creosote,' at 45 cents per gallon; then, what does not go into the above is converted into pitch, worth $40 per ton; or to saturate roofing paper and felt at a very fair profit. Coke sells at $7.50 to $8 per ton, delivered. Montana and Idaho are the Paradises of labor Unionism, and here can be seen to perfection to what lengths of unreasonableness these organizations can descend. Granted that much good has resulted to mankind by properly governed, organized labor, but the Butte organizations have graduated into the active practicing of such a paralyizing degree of tyranny that a detailed description of what I have learned is well-nigh, if not almost, unbelievable. For instance. A bricklayer has by accident picked up one brick in each hand, dropping the trowel he held at the time. The mighty 'Walking Loafer'—I meant 'Delegate'—or some one else has seen this and reported to the Union. The accused is promptly fined $25 for this heinous offense; and if he does not pay he may as well leave the country. Nor is this exaggerated in the least. The Gas Company employed a competent 'handy man' to put in a service, at a time when no plumber could be readily obtained. The Company is fined $500, and the poor fellow who did the work is also assessed $500!!! The fines had to be (and were) paid, else every other working man of any sort would have been called out of the employment of the Company, and no one would have dared take their places!!! Can you conceive anything in ancient or other autocratic days, of which we have any record, more tyrannical than this? I could go on and on with other examples, but the two given are likely enough; so they will suffice for to-day. This is labor unionism run rampant. I would find no fault with the rates of wages, though these are out of all proportion with services rendered, or in line with common sense. For example: Ordinary day laborers, $3.50; hod carriers, $4.50; cement concrete mixers (here this is a distinct branch of industry), $5.50; retort house stokers, $4.50; helpers, $4; carpenters, $7; bricklayers, $7 to $8; a plumber and his helper, $12 per day—the latter covering only 8 hours in every instance. On the other hand, clothing, food of all kinds, and refreshments of all sorts, are as reasonable or at like figures as to most things, even

more so—as those prevailing in the East. At a not very distant small gas works they use a compressor with a high pressure distribution system. The labor union decided that that was engineers' work, and so informed the Gas Company, which was then compelled to hire three stationary engineers, at the rate each of $4.50 per day of 8 hours. As the daily output is less than 20,000 cubic feet, one need not have much prophetical knowledge to tell what will soon happen. But here it is, 'briefly told:' Those who invested in that gas plant will lose their money, since the plant will have to be shut down, very likely. Then the people who wanted this greatest of modern conveniences—gas—will not be able to get it, and the 'three engineers' will go to the d——, or back to the Union at Butte."

MESSRS. JOHN AND MICHAEL O'NEIL, brothers, and workmen in the service of the New Orleans (La.) Gas Light Company, for 47 and 56 years, respectively, have been retired on pensions ample enough to enable them to put in their declining years in peace and plenty.

THE North Carolina Service Company, of High Point and Greensboro, proposes to supplement the establishing of a gas plant at the latter place by constructing one at High Point, which is growing at a rate sufficiently rapid and stable to guarantee the operation of such an enterprise at a good profit.

THE inwardness of the pernicious activity over control in the shares of the Nashville (Tenn.) Gas Company will soon crop out.

MR. FRANK J. POWERS has petitioned the Selectmen of South Attleboro, Mass., to permit the Pawtucket (R. I.) Gas Company to put its mains under the bed of the bi-secting river with a view to supplying the residents of the first named place with an adequate supply of its product.

WE are indebted to the courtesy of a correspondent in Philadelphia for the information that Mr. M.C. Whitaker, for several years the capable and painstaking Superintendent of the Welsbach Company in Philadelphia, and whose resignation from that important post was only recently accepted, was tendered a farewell dinner in the Hotel Walton, Philadelphia, the evening of the 27th ult. The word "farewell" causes us to hark-back a bit, since it means, of course, that Mr. Whitaker was about to go or had gone to some other field of duty. It is true that such is the case, in that Mr. Whitaker has accepted the Chair of Professor of Chemistry in Columbia University, New York, the importance and scope of which position require no elaboration at our hands, save we feel we must remark that no man better qualified to study its problems and solve them, to lend dignity without ostentation to its directing, to cause it continued fame as an educator in its particular theme, has occupied it, than shall be given it by its present incumbent. That he may have the undivided aid of his associates and the enthusastic support of the students will be the earnest wishes of all those who know him, whether these be in the gas business or out of it. Better than all this, however, is the knowledge that he does not propose to estrange himself altogether from the practical field of commercial chemistry, in that an arrangement has been happily made so that he may act for the Welsbach Company in the capacity of a consultant. Perhaps all of 75 of his associates in the Company, including all of its executive staff, were present at the dinner, the routine of which was nicely directed by Mr. Charles Bloomingdale. The material part of the feast was all that it should have been, and its closing was marked by the presentation to Mr. Whitaker of a handsome silver service as a sterling token of the respect, esteem and liking in which he is held by all of his colleagues in the Welsbach lists. The presentation was made by Mr. Sidney Mason, whose speech in connection therewith was more wholesouled than set, and the sentiments of which, while congratulating "Prof." Whitaker on his well-deserved promotion, were more than thinly tempered with words well-expressive of the living regret they felt at his personal going from them. We would like to be able to say that the rhetoric of the recipient's response was as accurate as is his knowledge of the text of Roscoe, *et. al.*, but that which it lacked in oratory was more than made up to his hearers by the certain ring of its heartiness.

THE Fire Department of New York city has awarded a contract for the equipping of 12 fire engines, the houses of which will be in especially selected locations, with circulating water heaters of the William Kane Manufacturing Company's type. This order was given after quite a series of severe tests.

A CORRESPONDENT in Lawrence, Mass., thus sums up the outcome of the prolonged gas agitation in Haverhill, Mass.: "The Haverhill gas users are in luck. They are going to have an immediate reduction in the gas rate to 90 cents per 1,000 cubic feet. On July 1, 1911, it is to be reduced to 85 cents, and when the consumption reaches 450,000,000 cubic feet in any one year the rate is to be cut to 80 cents. The city itself is to further benefit in that the Company agrees to pay into the city treasury for the current year the sum of $10,000 in taxes, the payment in latter account to increase in the sum of $1,000 annually, until 1915, after which year in no twelvemonth shall the taxes be less than $18,000.

MR. ANDREW J. HEALY has been appointed inspector of gas and electric meters in the service of the Holyoke (Mass.) City Government, succeeding Mr. T. A. Stack, retired.

Mr. C. B. ROBERTS, at one time Superintendent of the Belfast (Me.) Gas and Electric Company, and who later on entered the employment of the Stone & Webster Syndicate, being assigned to a comparatively unimportant post in connection with their enterprises in Ponce, Porto Rico, has been promoted to the post of Superintendent of Power in that territory. He has also been granted assistance in the person of Mr. F. R. Foot (Master Tech. Grad. Class of '08), who sailed for Porto Rico the last week in May.

MR. E. B. MOONEY, formerly Manager of the Brockton (Mass.) Gas Light Company, and who in 1906 accep ted a place on the selling staff of the New England Shoe Company, is again with the first named corporation.

BASING its claim on the grounds that the Columbus (O.) Natural Gas Company failed to deliver 252,232,608 cubic feet of gas which it had contracted to sell to the Columbus Gas and Fuel Company, the latter has instituted suit against former, putting its damages at the sum of $50,446.51. Complainant alleges that it contracted for the gas from the defendant to sell to its Columbus customers at 20 cents per 1,000 cubic feet. The contract called for the delivery of 1,140,000,000 cubic feet during the year ended April 1, 1909, and it is claimed that during the 12 months there was a shortage in the deliveries of 252,232,608 cubic feet. It is averred that the suit was really begun because the consumers in Columbus loudly complained of insufficient supply. The complaints in fact having been sufficiently pronounced to cause the City Council to appoint 2 experts to investigate the matter.

A SENSIBLE move towards the settlement of the gas controversy in Elgin (Ill.,) seems to have been made by Mayor Fuhrman, which resulted in the handing in by Alderman George Anderson, of his resignation as Chairman of the Special Committee of 14 which has been wrestling (wrangling would be a truer descriptive term) with that controversy for months.

THE Board of Public Utilities, Los A ngeles (Cal.), which was authorized to completely investigate the gas supply of that city (for Companies are having a try at it) with a view to determining a fair rate to charge for such supply, recommends the following: "For the ensuing fiscal year, however, in accordance with the unanimous recommendation of the engineers, and desiring to be strictly just, we recommend that our rate for gas be maintained at 80 cents per 1,000 cubic feet for all companies operating in the city of Los Angeles, excepting the one owned by the Southern California Edison Company, in San Pedro, Wilmington and Terminal Island, where we recommend that the rate of $1.35 per 1,000 cubic feet be established for the same period."

MR. G. M. SMITH, and associates, of Cleveland, O., have been awarded the franchise for supplying the residents of Port Clinton, O., with either natural or manufactured gas for a period of 50 years. They have been given 12 months in which to complete the plant and have the same in operation.

"B. F. M.," writing from Boston under date of May 29th, sends the following: "A verdict of $3,800 for the plaintiff was upheld by the United Strtes Circuit Court of Appeals last week in the case of Cecelia V. Moore, administratrix to D. W. Marston, late of Beverly, Mass., against the New England Telephone and Telegraph Company. Mr. Marston lost his life in removing a wire of defendant Company, which was resting on a pole of the Beverly Gas and Electric Light Company, his employer."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

MONDAY, JUNE 6, 1910.

The Market for Gas Securities.

Possibly, because the cotton market was dull and lower last week, we have a reason for the decline of 5 points in Consolidated during that period. We have no better reason to advance for this happening; but that the happening was as stated cannot be controverted. No real trouble of any sort or any deviation from the routine occurred, wherefore the drop was inexplicable. The quotation at noon to-day (Friday) was 136¼ to 136½. Hereafter quarterly dividends will be paid on Brooklyn Union shares, which are rather lower, at 143 to 146. Peoples, of Chicago, is at the tempting figure of under 106. Lacledes hold their own fairly well. The Byllesby Company announces a dividend of 1¼ per cent. on the preferred of the Muskogee (Okla.) Company.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JUNE 6.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	136¼	136½
Central Union Gas Co.— 1st 5's, due 1972, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River— 1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	143	146
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106½	107
Yonkers	299,650	500	130	—
Out-of Town Companies.				
Bay State	50,000,000	50	½	⅝
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73¼
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	99,500,000	100	93	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,632,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	103½	—
Mortgages, 6's	3,000,000		80	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	92	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	102⅝	102¾
Preferred	2,500,000	100	99	100
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	83	—
Preferred	25,000,000	100	90	—
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	105¾	106
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.— 1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	200	350	352½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

Advertisers' Index.

New advertising, or changes in standing ads., to assure attention the issue following their reception, must be in hand on Wednesday.

AMMONIA CONCENTRATORS.
Bartlett-Hayward Co., Baltimore, Md. 1121
Fred Bredel Co., Milwaukee, Wis. 1118
Michigan Ammonia Works, Detroit, Mich. 1100
The Gas Machinery Co., Cleveland, O. 1103
Western Gas Construction Co., Fort Wayne, Ind. 1123

BURNERS.
Wm. M. Crane Co., New York City 1112

CEMENTS AND CONCRETES.
C. L. Gerould, New Castle, Pa. 1116
Ernst Strassburger, Chicago, Ills. 1116
Glidden Varnish Co., Cleveland, O. 1100
Laclede-Christy Clay Products Co., St. Louis, Mo. 1106

CHARGING BARROWS & COAL WAGONS.
Davis & Farnum Mfg. Co., Waltham, Mass. 1120
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1123
The Stacey Mfg. Co., Cincinnati, O. 1124

COKE CRUSHERS.
Bartlett-Hayward Co., Baltimore, Md. 1121
C. M. Keller, Columbus, Ind. 1119

CONVEYORS—ALL KINDS.
Bartlett-Hayward Co., Baltimore Md. 1121
Brown Hoisting Machinery Co., Cleveland, O. 1106
Cruse-Kemper Co., Ambler, Pa. 1108
C. W. Hunt Company, New York City 1120
Fred Bredel Co., Milwaukee, Wis. 1118
G. A. Bronder, New York City 1117
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1123
The Gas Machinery Co., Cleveland, O. 1103
The Stacey Mfg. Co., Cincinnati, O. 1123
Western Gas Construction Co., Fort Wayne, Ind. 1123

EXHAUSTERS.
Connelly Iron Sponge & Governor Co., New York City 1117
Connersville Blower Company, Connersville, Ind. 1124
Davis & Farnum Mfg. Co., Waltham, Mass. 1120
Isbell-Porter Company, Newark, N. J. 1104
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1123
Piqua Blower Co., Piqua, O. 1109
The P. H. & F. M. Roots Co., Connersville, Ind. 1111

GAS AND WATER PIPES.
Davis & Farnum Mfg. Co., Waltham, Mass. 1120
Donaldson Iron Co., Emaus, Pa 1112
R. D. Wood & Co., Philadelphia, Pa. 1126

GAS BLAST FURNACES.
American Gas Furnace Co., New York City 1104

GAS COALS.
Berwind-White Coal Mining Co., New York and Phila. 1118
Westmoreland Gas Coal Co., Philadelphia, Pa. 1119

GAS COCKS.
H. Mueller Manufacturing Co., Decatur, Ills. 1111

GAS ENGINEERS.
Bartlett-Hayward Co., Baltimore, Md. 1121
Cruse-Kemper Co., Ambler, Pa. 1108
Davis & Farnum Mfg. Co., Waltham, Mass. 1120
Drakes Limited, Halifax, England. 1101
Edwin E. Witherby, New York City 1100
Evens & Howard Firebrick Co., St. Louis, Mo. 1055
Frank D. Moses, Trenton, N. J. 1064
Fred Bredel Co., Milwaukee, Wis. 1118
Frederick J. Mayer, New York City 1122
Henry L. Lea, Chicago, Ills. 1119
H. M. Byllesby & Co., Chicago, Ills. 1120
Humphreys & Glasgow, New York City 1120
Improved Equipment Company, New York City 1103
Isbell-Porter Co., Newark, N. J. 1104
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1123
Laclede-Christy Clay Products Co., St. Louis, Mo. 1106
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 1116
Quintard Iron Works, New York City 1109
R. D. Wood & Co., Philadelphia, Pa. 1126
The Gas Machinery Co., Cleveland, O. 1103
The Stacey Mfg. Co., Cincinnati, O. 1122
The United Gas Improvement Co., Philadelphia, Pa. 1115
Western Gas Construction Co., Fort Wayne, Ind. 1123
William A. Baehr, Chicago, Ills. 1100
William W. Randolph, New York City 1113

GAS ENRICHERS.
Standard Oil Co., New York City 1110

GAS GAUGES.
The Bristol Co., Waterbury, Conn. 1112

GAS GOVERNORS.
Chaplin-Fulton Mfg. Co., Pittsburg, Pa. 1127
Connelly Iron Sponge & Governor Co., New York City 1117
Evens & Howard Firebrick Co., St. Louis, Mo. 1055
Isbell-Porter Co., Newark, N. J. 1104
Pittsburg Meter Co., East Pittsburg, Pa. 1110
Reynolds Gas Regulator Co., Anderson, Ind. 1117

GASHOLDERS.
Bartlett-Hayward Co., Baltimore, Md. 1121
Chicago Bridge and Iron Works, Chicago, Ills. 1102
Cruse-Kemper Co., Ambler, Pa. 1108
Davis & Farnum Mfg. Co., Waltham, Mass. 1120
Deily & Fowler Mfg. Co., Philadelphia, Pa. 1124
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1123
R. D. Wood & Co., Philadelphia, Pa. 1126
Riter-Conley Mfg. Co., Pittsburgh, Pa. 1107
The Stacey Mfg. Co., Cincinnati, O. 1123
Western Gas Construction Co., Fort Wayne, Ind. 1123

GAS MAIN STOPPERS.
Safety Gas Main Stopper Co., New York City 1119

GAS METER CONNECTIONS.
H. Mueller Manufacturing Co., Decatur, Ills. 1111

GAS METERS.
American Meter Co., New York and Philadelphia. 1127
D. McDonald & Co., Albany, N. Y. 1127
Helme & McIlhenny, Philadelphia, Pa. 1127
John J. Griffin & Co., Philadelphia, Pa. 1080
Keystone Meter Co., Royersford, Pa. 1126
Maryland Meter and Mfg. Co., Baltimore, Md. 1126
Metric Metal Co., Erie, Pa. 1127
Nathaniel Tufts Meter Co., Boston, Mass. 1126
New York Improved Meter Co., New York City 1126
Pittsburg Meter Co., East Pittsburg, Pa. 1110
Rotary Meter Co., New York City 1125
Sprague Meter Co., Bridgeport, Conn. 1125

GAS PLANT TOOLS.
H. Mueller Manufacturing Co., Decatur, Ills. 1111

GAS STOVES.
American Meter Co., New York and Philadelphia. 1127
Keystone Meter Co., Royersford, Pa. 1126
Maryland Meter & Manufacturing Co., Baltimore, Md. 1126
Nathaniel Tufts Meter Co., Boston, Mass. 1126

GAS TAPPING MACHINES.
George Light, Dayton, O. 1119
H. Mueller Manufacturing Co., Decatur, Ills. 1111

GAS WORKS APPARATUS AND CONSTRUCTION.

Bartlett-Hayward Co., Baltimore, Md.....1121
Connelly Iron Sponge & Governor New Co., York City.1117
Cruse-Kemper Co., Ambler, Pa.....1108
Davis & Farnum Mfg. Co., Waltham, Mass.....1120
Deily & Fowler Mfg. Co., Philadelphia, Pa.....1111
Evens & Howard Firebrick Co., St. Louis, Mo.....1055
Fred Bredel Co., Milwaukee, Wis.....1118
Gas Engineering Co., Trenton, N. J.....1064
Humphreys & Glasgow, New York City.....1110
Improved Equipment Company, New York City.....1113
Isbell-Porter Co., New York City.....1104
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1123
Laclede-Christy Clay Products Co., St. Louis, Mo.....1106
Lloyd Construction Co., Detroit, Mich.....1110
Quintard Iron Works Co., New York City.....1109
R. D. Wood & Co., Philadelphia, Pa.....1126
Riter-Conley Mfg. Co., Pittsburgh, Pa.....1107
The Gas Machinery Co., Cleveland, O.....1103
The Stacey Mfg. Co., Cincinnati, O.....1123
The United Gas Improvement Co., Philadelphia, Pa...1115
Western Gas Construction Co., Fort Wayne, Ind.....1128

HIGH PRESSURE GAS GOODS.

H. Mueller Manufacturing Co., Decatur, Ills.....1111

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich.....1110

INCANDESCENT GAS LAMPS.

General Gas Light Co., Kalamazoo, Mich.....1105
Welsbach Company, Gloucester, N. J.....1114

INCLINED RETORTS.

Baltimore Retort and Firebrick Co., Baltimore, Md...1116
Didier-March Co., New York City.....1122
Evens & Howard Firebrick Co., St. Louis, Mo.....1055
Fred Bredel Co., Milwaukee, Wis.....1118
Gas Bench Construction Co., St. Louis, Mo.....1109
Improved Equipment Company, New York City.....1113
Laclede-Christy Clay Products Co., St. Louis, Mo.....1106
Parker-Russell Mining and Mfg. Co., St. Louis, Mo...1116

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y.....1119

PATENTS, TRADE-MARKS & COPYRIGHTS

Royal E. Burnham, Wasnington, D. C.....1119

PIPE LINE TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills.....1111

PREPAYMENT METER ATTACHMENTS.

New York Improved Meter Co., New York City.....1126

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia.....1127
D. McDonald & Co., Albany, N. Y.....1125
Helme & McIlhenny, Philadelphia, Pa.....1127
John J. Griffin & Co., Philadelphia, Pa.....1080
Keystone Meter Co., Royersford, Pa.....1126
Nathaniel Tufts Meter Co., Boston, Mass.....1126
New York Improved Meter Co. New York City.....1126
Pittsburg Meter Co., East Pittsburg, Pa.....1110
Sprague Meter Co., Bridgeport, Conn.....1125

PROCESSES.

Bartlett-Hayward Co., Baltimore, Md.....1121
Fred Bredel Co., Milwaukee, Wis.....1118
Humphreys & Glasgow, New York City.....1120
Improved Equipment Company, New York City.....1113
The Gas Machinery Co., Cleveland, O.....1103
The United Gas Improvement Co., Philadelphia, Pa...1115
Western Gas Construction Co., Fort Wayne, Ind.....1128

PRODUCER POWER PLANTS.

R. D. Wood & Co., Philadelphia, Pa.....1126

PURIFIER AND SCRUBBER TRAYS.

Bartlett-Hayward Co., Baltimore, Md.....1121
Cabot Mfg. Co., Hoboken, N. J.....1119
Western Gas Construction Co., Fort Wayne Ind.....1123

PURIFIERS.

Bartlett-Hayward & Co., Baltimore, Md.....1121
Connelly Iron Sponge & Governor Co., New York City.1117
Cruse-Kemper Co., Ambler, Pa.....1108
Davis & Farnum Mfg. Co., Waltham, Mass.....1120
Evens & Howard Firebrick Co., St. Louis, Mo.....1055
Isbell-Porter Co., Newark, N. J.....1104
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1123
Quintard Iron Works, New York City.....1109
R. D. Wood & Co., Philadelphia, Pa.....1126
The Stacey Mfg. Co., Cincinnati, O.....1123
The United Gas Improvement Co., Philadelphia, Pa...1115
Western Gas Construction Co., Fort Wayne, Ind.....1128

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City1117
F. Behrend, New York City.....1102
The United Gas Improvement Co., Philadelphia, Pa...1115

REGENERATIVE FURNACES.

Baltimore Retort and Firebrick Co., Baltimore, Md..1116
Bartlett, Hayward & Co., Baltimore, Md.....1121
Didier-March Co., New York City.....1124
Evens & Howard Firebrick Co., St. Louis, Mo.....1055
Fred Bredel Co., Milwaukee, Wis.....1118
Gas Bench Construction Co., St. Louis, Mo.....1109
Improved Equipment Company, New York City.....1113
J. H. Gautier & Co., Jersey City, N. J.....1116
Laclede-Christy Clay Products Co., St. Louis, Mo.....1106
Missouri Firebrick Co., St. Louis, Mo.....1116
Parker-Russell Mining and Mfg. Co., St. Louis, Mo...1116

RETORTS AND FIREBRICKS.

Baltimore Retort and Firebrick Co., Baltimore, Md...1116
Didier-March Co., New York City.....1122
Evens & Howard Firebrick Co., St. Louis, Mo.....1055
Fred Bredel Co., Milwaukee, Wis.....1118
Gas Bench Construction Co., St. Louis, Mo.....1109
Henry Maurer & Son, New York City.....1109
Improved Equipment Company, New York City.....1113
James Gardner, Jr., Co., Bolivar, Pa.....1 14
J. H. Gautier & Co., Jersey City, N. J.....1116
Laclede-Christy Clay Products Co., St. Louis, Mo.....1106
Missouri Firebrick Co., St. Louis, Mo.....1116
Parker-Russell Mining and Mfg. Co., St. Louis, Mo....1116

SCRUBBERS AND CONDENSERS.

Bartlett-Hayward Co., Baltimore, Md.....1 21
Cruse-Kemper Co., Amler, Pa.....1108
Davis & Farnum Mfg. Co., Waltham, Mass.....1120
Evens & Howard Firebrick Co., St. Louis, Mo.....1055
Fred Bredel Co., Milwaukee, Wis.....1118
Isbell-Porter Co., Newark, N. J.....1104
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1123
Quintard Iron Works, New York City.....1109
R. D. Wood & Co., Philadelphia, Pa.....1126
Riter-Conley Mfg. Co., Pittsburgh, Pa.....1107
The Gas Machinery Co., Cleveland, O.....1103
The Stacey Mfg. Co., Cincinnati, O.....1123
The United Gas Improvement Co., Philadelphia, Pa...1115
Western Gas Construction Co., Fort Wayne, Ind.....1128

SELF-SEALING MOUTHPIECE DOORS.

Bartlett-Hayward Co., Baltimore, Md.....112
Davis & Farnum Mfg. Co., Waltham, Mass.....1110
Fred Bredel Co., Milwaukee, Wis.....1118
Isbell-Porter Co., Newark, N. J.....1104
Improved Equipment Company, New York City.....1113
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1123
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.....1116
Quintard Iron Works, New York City.....1109
R. D. Wood & Co., Philadelphia, Pa.....1126
The Gas Machinery Co., Cleveland, O.....1103
The Stacey Mfg. Co., Cincinnati, O.....1123
Western Gas Construction Co., Fort Wayne, Ind.....1128

STOKING MACHINERY.

Fred Bredel Co., Milwaukee, Wis.....1118
G. A. Bronder, New York City.....1117
Laclede-Christy Clay Products Co., St. Louis, Mo.....1106
Parker-Russell Mining and Mfg. Co., St Louis, Mo. ...1116

STORAGE TANKS.

Bartlett-Hayward Co., Baltimore, Md.....1121
Davis & Farnum Mfg. Co., Waltham, Mass.....1120
Quintard Iron Works, New York City.....1109
The Stacey Mfg. Co., Cincinnati, O.....1123
Western Gas Construction Co., Fort Wayne, Ind.....1128

STREET LAMPS.

Thos. T. W. Miner, New York City.....1101
Welsbach Street Lighting Co., New York and Phila..11 4

TAR AND CARBONIC ACID EXTRACTOR.

Bartlett-Hayward Co., Baltimore, Md.....1121
Fred Bredel Co., Milwaukee, Wis.....1118
Isbell-Porter Co., Newark, N. J.....1104
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1123
The Gas Machinery Co., Cleveland, O.....1103
The Stacey Mfg. Co., Cincinnati, O.....1123
The United Gas Improvement Co., Philadelphia, Pa...1115
Western Gas Construction Co., Fort Wayne, Ind.....1128

VALVES.

Bartlett-Hayward & Co., Baltimore, Md.....1121
Davis & Farnum Mfg. Co., Waltham, Mass.....1120
Isbell-Porter Co., Newark, N. J.....1104
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1123
Ludlow Valve Manufacturing Co., Troy, N. Y.....1101
R. D. Wood & Co., Philadelphia, Pa.....1126
The Gas Machinery Co., Cleveland, O.....1103
The P. H. & F. M. Roots Co., Connersville, Ind.....1111
The Stacey Mfg. Co., Cincinnati, O.....1123
Western Gas Construction Co., Fort Wayne, Ind.....1128

VERTICAL S'S.

Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 1117
Didier-March Co., New York City.....1122
Evens & Howard Firebrick Co., St. Louis, Mo.....1055
Fred Bredel Co., Milwaukee, Wis.....1118
Gas Bench Construction Co., St. Louis, Mo.....1109
Improved Equipment Company, New York City.....1122
Laclede-Christy Clay Products Co., St. Louis, Mo.....1106
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. ..1116

WATER METERS.

Pittsburg Meter Co., East Pittsburg, Pa.....1110

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

IMPROVED AMMONIA CONCENTRATOR.

About 130 In use. Write to

STROH & OSIUS, Patentees, or

MICHIGAN AMMONIA WORKS, - Detroit, Mich.

GLIDDEN'S

WATERPROOF CONCRETE FLOOR DRESSING

Prevents Dusting and Absorption.

LIQUID CEMENT

For Exterior or Interior Concrete Surfaces. Radiates Light--Can be Applied over damp Surfaces.

GRAPHITE ACID PROOF COATING

For Metallic Surfaces Submitted to Extreme Corrosive Conditions.

THE GLIDDEN VARNISH COMPANY,

CLEVELAND, OHIO.

BRANCHES: Atlanta, Boston, Chicago, New York, St. Louis.

GRATIS SAMPLES UPON REQUEST.

WILLIAM A. BAEHR,

CONSULTING ENGINEER,

Peoples Gas Building,

CHICAGO.

Also Representing

The Bartlett-Hayward Company.

EDWIN E. WITHERBY,

SPECIAL REPRESENTATIVE

GAS MACHINERY COMPANY,

CLEVELAND, O.,

Will advise on commercial engineering subjects and operation of gas and electric properties.

40 WALL STREET, - NEW YORK.

Celebrated Lux Gas Purifying Mass

Will Save 50 Per Cent. Labor.

Used in the Gas Works of Berlin, Kiel, Frankfort, Vienna, Amsterdam, Antwerp, London, Edinburgh, Copenhagen, Madrid, Seville, Barcelona, Rio de Janeiro and others. :: :: ::

Sole Importer, F. BEHREND,

54 Front St., New York.

Position Wanted

As Manager, Coal or Water Gas Plant.

Twenty years' experience. Best of references. Please address answers to

18 6-2 "H, C.," care this Journal.

Position Wanted

AS MANAGER OF GAS PLANT.

Am now superintendent and acting manager of a plant sending out 2 0,000 cubic feet daily. Started as gas maker and have been through all the d partments.

Address, "ADVANCE,"

18 6-1 Care this Journal.

Situation Wanted

As Superintendent of Gas Department of a Gas and Electric Company,

By a man with 18 years' experience in all branches of the manufacture and distribution of coal, water and oil gas, both high and low pressure. West or South preferred.

Address, "ABILITY,"

1825-2 Care this Journal.

Position Wanted

As superintendent or manager of a gas plant, combined gas and electric, superintendent of distribution or construction, or any position of responsibility. With present company 10 years. Employed, but can accept position immediately. Address, "COMBINED,"

1825-3 Care this Journal.

Position Wanted

As Superintendent of Coal Gas Plant

In city of 25,000 to 50.000 population. Can furnish best of references. State full particulars in first letter. Address, "S. A. W.,"

18 6-2 Care this Journal.

Position Wanted.

Technical graduate desires position. Five years' experience in the distribution department of a large gas company. Address, "JR.,"

1826-1 Care this Journal.

I can put **GAS OWNERS** in touch with one of the most successful gas managers in the United States, technically and financially. Would prefer vicinity of New York or the South, but not necessarily.

Address, LEIGH RAYMOND, care this Journal.

1826-1

WANTED.

A Competent Coal Gas Maker.

One who understands the business thoroughly and can get results. Operating 1 bench of 6's. Must be familiar with exhausters, engines, blowers, heats, etc., and not afraid of work. None other than one understanding his business, and an abstainer from alcohol, need apply. State experience had and salary wanted. Permanent position with house to live in on premises.

1825-2 Address, "B. G. L. C.," care this Journal.

WANTED,

Competent Water Gas Maker.

NEW BRITAIN GAS LIGHT COMPANY.

1825-2 NEW BRITAIN, CONN.

METER REPAIRERS WANTED.

Two First-Class Meter Repairers Wanted.

Steady positions for competent workmen. Address, stating age, experience and wages expected, **Fall River Gas Works Co.,**

1826-2 Fall River, Mass.

WANTED,

AN EXPERIENCED SOLICITOR,

By a W stern gas company. City of 14,000, near St. Louis. State experience, references and salary expected.

1-26-1 Address, "GOOD," care this Journal.

FOR SALE,

One set of 4 purifying boxes 12 feet 8 inches by 10 feet 9 inches by 3 feet, in good condition, with centerseal and 10-inch connections.

1771-tf YORK GAS CO., York. Pa.

FOR SALE,

Second-Hand Meters and Lead Connections.

One thousand 5-light, four hundred 3-light and twenty-five 10-light meters for artificial gas. **Vincennes Light & Power Co.,**

1-24 4eot Vincennes, Ind.

WANTED.

Working Foreman for Coal Gas Plant,

In town of 5,000 inhabitants. Address,

PAINESVILLE GAS LIGHT & COAL COMPANY,

1826-1 PAINESVILLE, O.

STANDARD REDUCTION FACTORS for GASES,

By Helon Brooks MacFarland, B.S., M.M.E.

Price, $1.50. *For Sale by*

A. M. Callender & Co., 42 Pine St., New York City.

Practical Handbook on

GAS ENGINES,

With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.

Translated with Permission of the Author,

By GEO. M. RICHMOND, M.E.

Price, $1.

For Sale by

AMERICAN GAS LIGHT JOURNAL,

42 Pine St., New York City.

DRAKES

LIMITED,

HALIFAX, ENGLAND.

GAS ENGINEERS AND CONTRACTORS.

"THE MINER"

GLOBE STREET LAMPS.

OVER FORTY YEARS IN USE THE WORLD OVER.

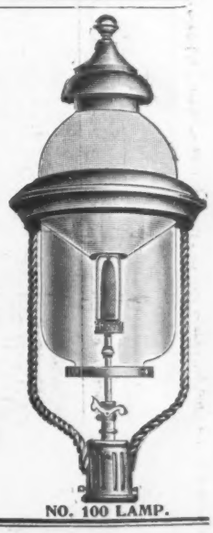
THE BEST STREET LAMPS for ALL KINDS OF GAS OR BURNERS.

This is only one of a Large Variety of Styles.

SEND FOR CATALOGUE.

THOS. T. W. MINER,

821 and 823 Eagle Avenue, New York.



NO. 100 LAMP.

BINDERS

FOR THE

JOURNAL.

PRICE,

$1.

FOR SALE BY

AMERICAN GAS LIGHT JOURNAL 42 Pine St., New York City.

GAS HOLDERS,

STANDPIPES—OIL TANKS—SCRUBBERS—WATER TOWERS,

DESIGNED, CONSTUCTED AND ERECTED.

Capacity, 2,380,000 gallons. SCHENECTADY, N. Y. City Water Works. Diameter 90 feet. Height, 50 feet.

ESTIMATES ON APPLICATION.

CHICAGO BRIDGE AND IRON WORKS,

MAIN OFFICE AND WORKS:
Washington Heights Station, Chicago.

BRANCH OFFICES:
30 Church Street, New York, N. Y.
Praetorian Building, Dallas, Texas.

P. PLANTINGA, President W. E. STEINWEDELL, Secretary

THE GAS MACHINERY CO.,

Main Office and Shops

CLEVELAND, OHIO.

COAL AND WATER GAS APPARATUS

EXHAUSTERS, CONDENSERS, SCRUBBERS,
TAR EXTRACTORS, WASHERS, PURIFIERS,
VALVES, CONNECTIONS,
BY PRODUCT MACHINERY,
COMPLETE GAS PLANTS.

RETORT HOUSE GOVERNOR.—Write for Bulletin Form No. 278.

THE GAS MACHINERY CO.
CLEVELAND, OHIO.

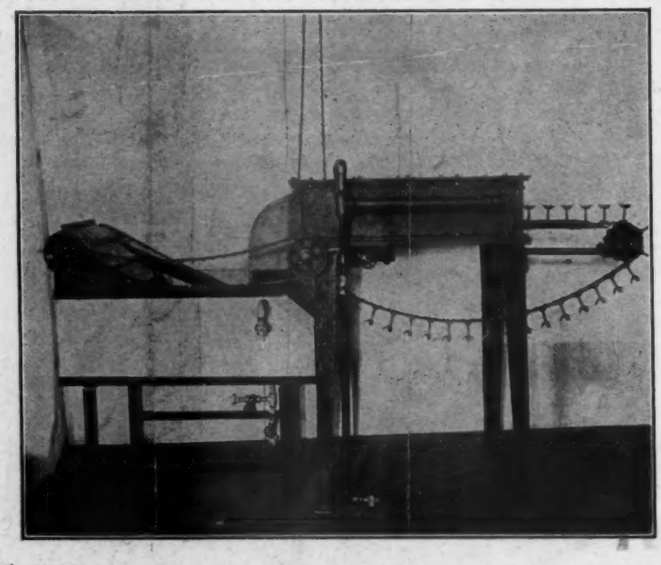
GAS FURNACES and HEATING MACHINES

STATE

AMOUNT -
SIZE - -
KIND - -

OF WORK

to be done in given time.



Heating Machine for Treating Watch Case Blanks and Other Similar Work, with Cooling Bath Attachment.

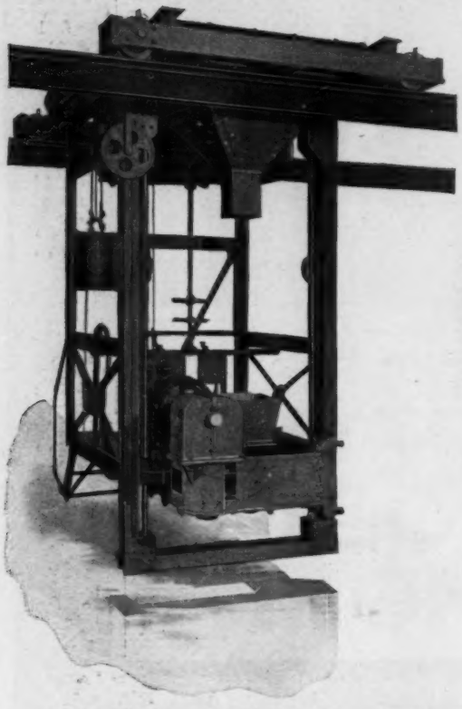
FOR

INDUSTRIAL PURPOSES.

CATALOGUE SENT ON APPLICATION.

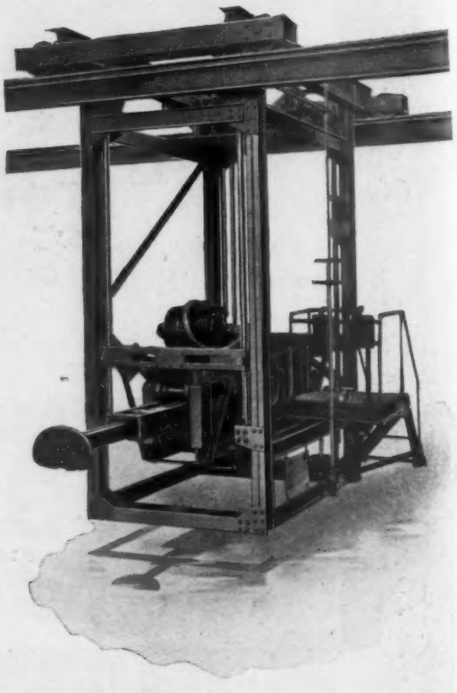
AMERICAN GAS FURNACE COMPANY,
24 John Street, New York, N. Y.

CHARGING AND DISCHARGING MACHINERY.



GET 100
CANDLE FEET
BY CARBONIZING
IN FULL RETORTS.

GET FULL
RETORTS
BY USING
THESE MACHINES.



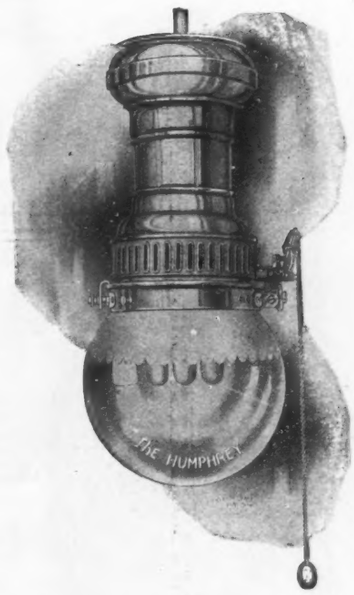
ISBELL-PORTER COMPANY,
NEWARK, N. J.

ANYBODY CAN STRING WORDS TOGETHER.

THINK IT OVER.

WE SELL MORE HUMPHREY INVERTED GAS ARC LAMPS THAN ALL OTHER KINDS MADE.

WHY?



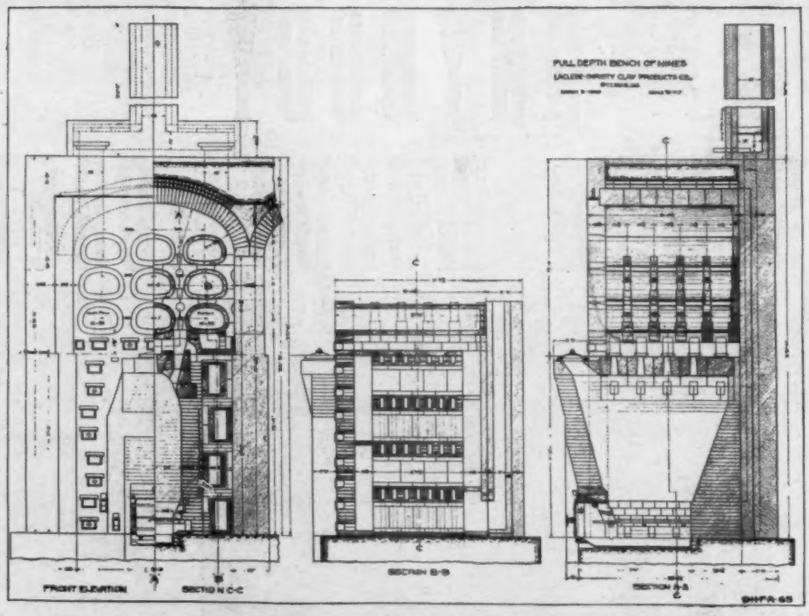
THINK IT OVER.

GENERAL GAS LIGHT COMPANY.

Kalamazoo. New York. San Francisco.
London, England. Bremen, Germany. Wellington, New Zealand.

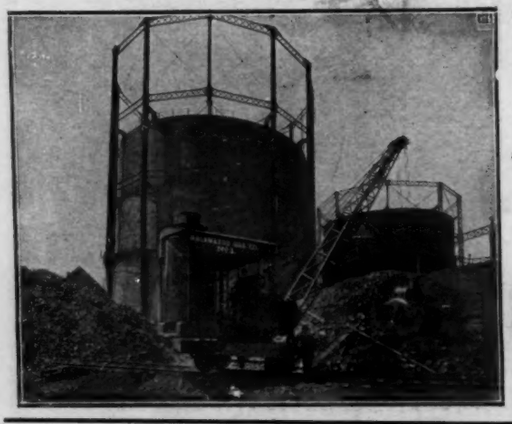
WE BUILD ALL TYPES OF BENCHES.

NOTE ESPECIALLY SUBSTANTIAL AND EFFICIENT DESIGN OF RECUPERATORS.



NOTE EXTREMELY HEAVY CONSTRUCTION THROUGHOUT THE BENCH.

FULL-DEPTH BENCH OF NINES,
AS BUILT BY
LACLEDE-CHRISTY CLAY PRODUCTS CO.,
ST. LOUIS, MO.



"BIG SAVING" in your handling account using a "BROWNHOIST" LOCOMOTIVE CRANE AND GRAB BUCKET.

The illustration shows equipment in use at Kalamazoo Gas Company, Kalamazoo, Mich.

The Brown Hoisting Machinery Co.,
CLEVELAND, O.

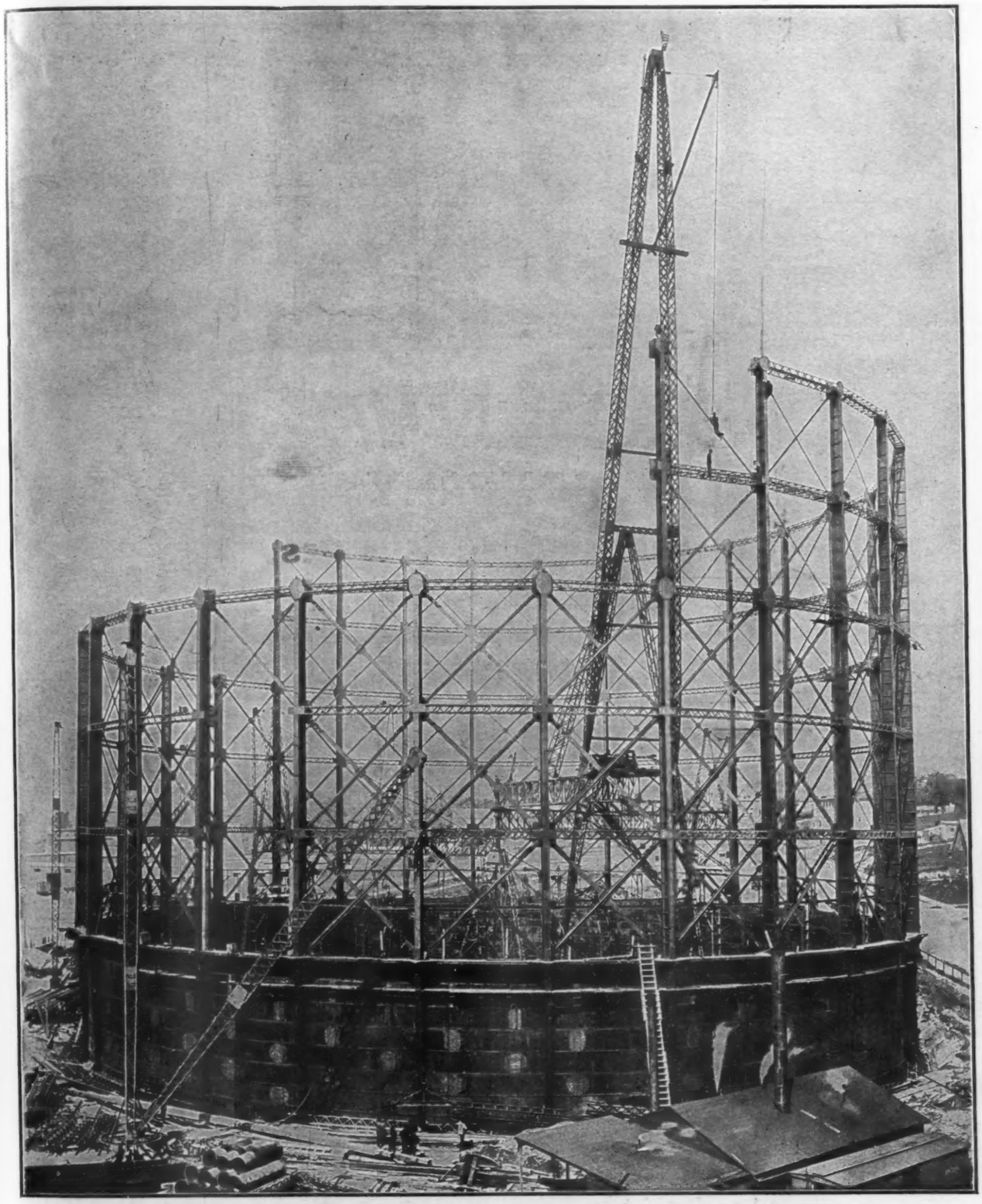
Gas Analyst's Manual,

By JAQUES ABADY, M. Inst. Mech. E.

(Incorporating F. W. Hartley's "Gas Analyst's Manual" and "Gas Measurement.")

Ninety-three Illustrations and Nine Folding Plates.
Bound in Handsome Half Leather. Price, - $6.50.

FOR SALE BY
AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.



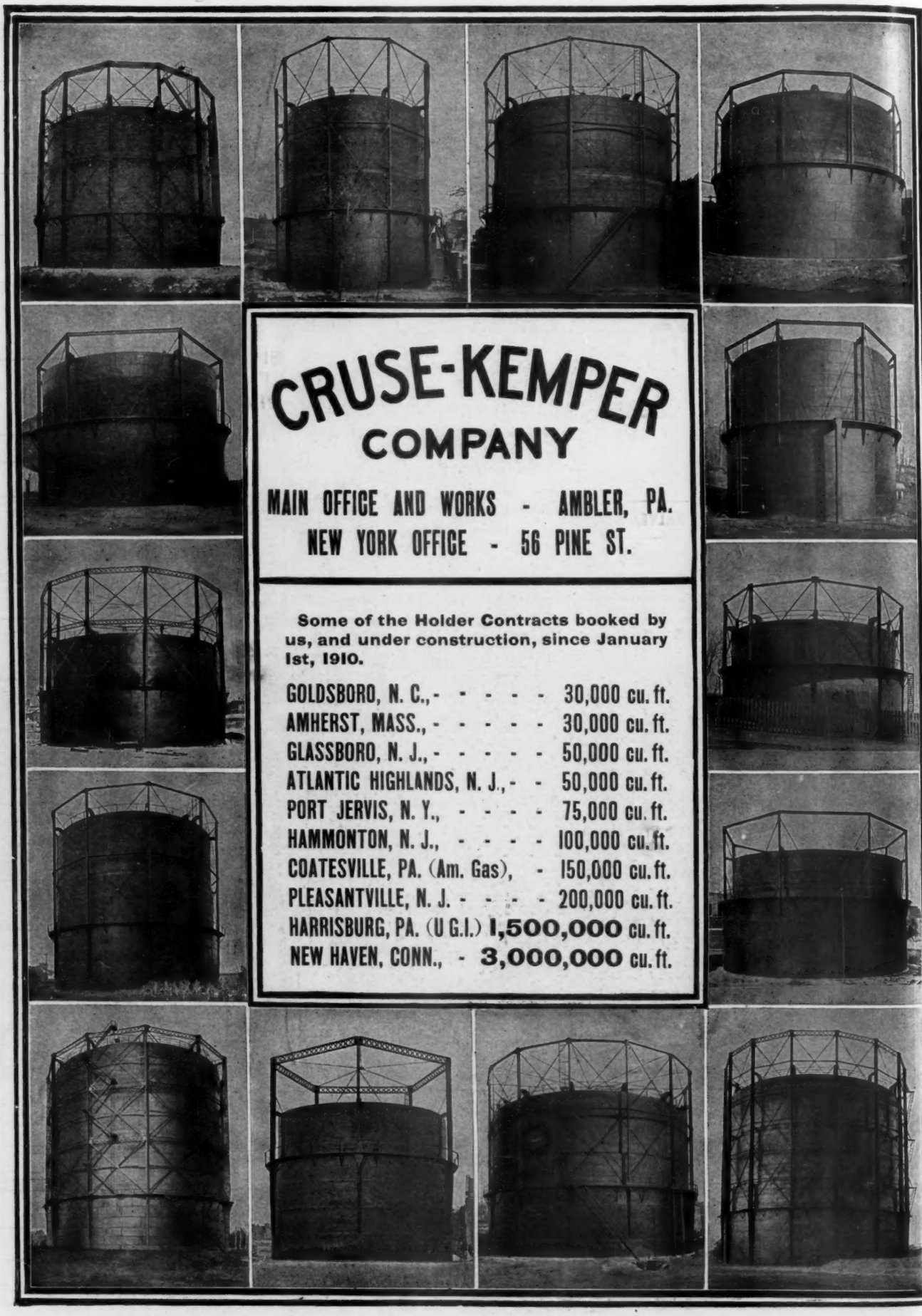
Erecting Gasholder Guide Frame with Electric Steel Traveling Derrick 225 Feet High.

RITER-CONLEY MFG. CO.,

PITTSBURGH.

PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

COMPLETE COAL GAS PLANTS.


CRUSE-KEMPER
COMPANY
MAIN OFFICE AND WORKS - AMBLER, PA.
NEW YORK OFFICE - 56 PINE ST.
Some of the Holder Contracts booked by us, and under construction, since January 1st, 1910.
GOLDSBORO, N. C., - - - - - 30,000 cu. ft.
AMHERST, MASS., - - - - - 30,000 cu. ft.
GLASSBORO, N. J., - - - - - 50,000 cu. ft.
ATLANTIC HIGHLANDS, N. J., - - 50,000 cu. ft.
PORT JERVIS, N. Y., - - - - 75,000 cu. ft.
HAMMONTON, N. J., - - - - 100,000 cu. ft.
COATESVILLE, PA. (Am. Gas), - 150,000 cu. ft.
PLEASANTVILLE, N. J. - - - - 200,000 cu. ft.
HARRISBURG, PA. (U G.I.) 1,500,000 cu. ft.
NEW HAVEN, CONN., - 3,000,000 cu. ft.

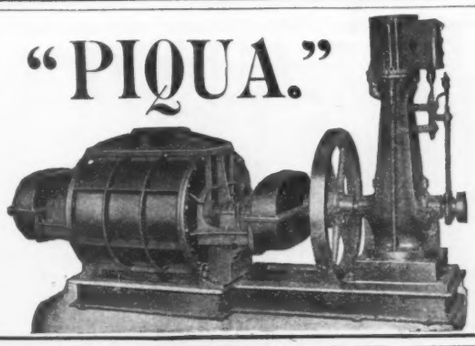
GAS EXHAUSTERS AND BLOWERS.

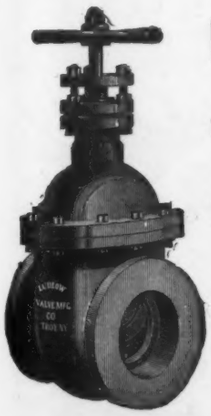
We have a full line of sizes for all standard pressures. The design, material and workmanship is A-1. Prompt Delivery and Reasonable Prices. WHY NOT give us YOUR requirements?

THE PIQUA BLOWER CO.,

PIQUA, OHIO.

"PIQUA."





THE

Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

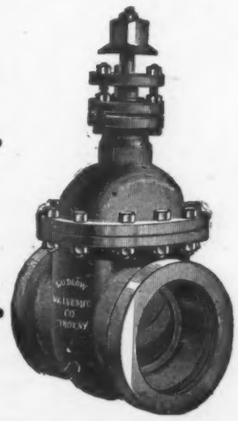
Double and Single Gate Valves, ¼" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.



QUINTARD IRON WORKS CO.,

Foot of Twelfth Street and East River, New York.

BENCH WORK,
CONDENSERS,
SHAVING SCRUBBERS,
CAST IRON FLANGED PIPE,
RIVETED STEEL PIPE.

FREDERICK W. FLOYD, Engineer.

ESTABLISHED 1856.

HENRY MAURER & SON,

Manufacturers of

High Grade Firebrick, Blocks, Tiles,

ETC.,

Works: Maurer, N. J. Office: 420 E. 23d St., N. Y. City.

GAS BENCH CONSTRUCTION CO.,

ST. LOUIS, MO.

COAL GAS BENCHES.

HORIZONTAL.——INCLINED.——VERTICAL.

WE HAVE ALL TYPES and SIZES IN SUCCESSFUL OPERATION.
BUILT AFTER OUR OWN DESIGNS and WITH OUR OWN MATERIALS.

WATER GAS LININGS, CHECKERBRICK.

ALL WORKMANSHIP, MATERIAL AND RESULTS GUARANTEED.

JUST PUBLISHED.

Catechism of Central Station Gas Engineering in the United States.

Compiled from the questions and answers sent out to the Practical Class, Trustees Gas Education Fund.

Section I. General Definitions. Section II. Manufacturing Materials. Section III. Manufacturing Plant---Construction and Operation
Section IV. Distribution System and Consumers' Appliances. Section V. Chemical. Section VI. Physical.
Section VII. Masonry Construction. Section VIII. Miscellaneous.

6¼ INCHES BY 9 INCHES. 672 PAGES ILLUSTRATED.

PRICE:

Cloth, $5 net, plus postage. Flexible Leather, $7 net, plus postage.

For Sale by TRUSTEES GAS EDUCATIONAL FUND 58 William Street, New York City.

IRONCLAD

CAST IRON DRY

Gas Meters

ARE THE BEST.

This is not a boast, but the reiteration of an acknowledged fact.

We can prove this in any manner you may suggest.

SEND FOR CATALOG 105

Pittsburg Meter Company

General Offices and Works, East Pittsburg, Pa.

New York, 149 Broadway. Kansas City, 6 West 10th Street.
Chicago, 256 Madison Street. Seattle, 8th and Madison Streets.
San Francisco, 149 New Montgomery Street.

Manufacturers of Gas Meters and Water Meters.

ORDER NOW

TO GET PROMPT SHIPMENT.

HUMPHREY AUTOMATIC GAS WATER HEATERS

Have the valve at the top; easy and cheap to connect; a sootless bunsen flash pilot; a galvanized, rust-proof, non-clogging burner, and many other things making for trouble freedom and high efficiency.

GUARANTEED.

They Make Pleased Users.

HUMPHREY CO.,
Kalamazoo, Mich.

LLOYD CONSTRUCTION COMPANY

GAS APPARATUS.

DETROIT - MICHIGAN

SAVE $ THE DOLLARS

BY USING

THE SAFEST, SIMPLEST, STRONGEST AND MOST SATISFACTORY

PREPAYMENT METERS.

TRY THEM

AND YOU WILL BE CONVINCED OF THEIR EXCELLENCE.

NEW YORK IMPROVED METER CO.,

306-310 EAS. 47TH ST., NEW YORK CITY.

PACIFIC COAST REPRESENTATIVES:

NORTHWEST GAS EQUIPMENT COMPANY, PORTLAND, ORE.

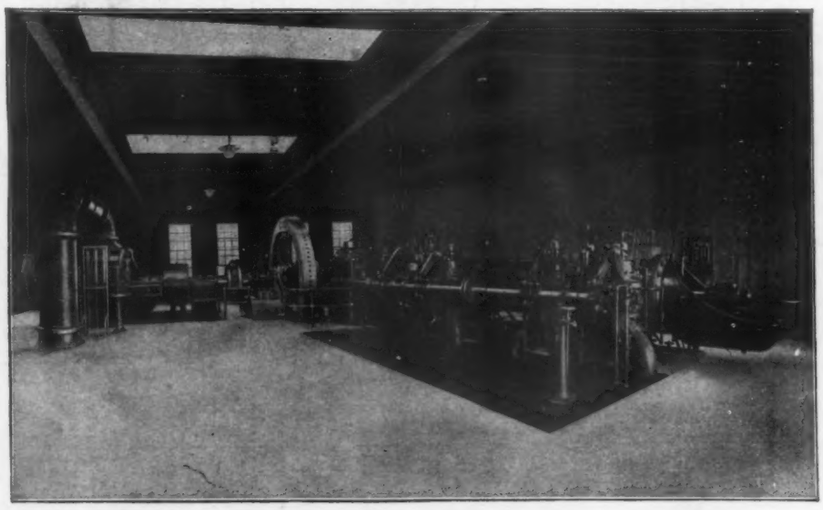
PUBLIC LIGHTING TABLES FOR JUNE, 1910.

[Communicated by The American Meter Company.]

Day of Week.	Table No. 1. FOLLOWING THE MOON. Date.	Light.	Extinguish.	Day of Week.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Date.	Complete Lighting in 1 Hour. From Time Given.	Complete Extinguishing in 50 Minutes. From Time Given.
		P.M.				P.M.	A.M.
Wed.	1	7.50	2.40 A.M.	Wed.	1	7.12	3.17
Thu.	2	7.50	3.00	Thu.	2	7.12	3.17
Fri.	3	7.50	3.30	Fri.	3	7.12	3.17
Sat.	4	7.50	3.30	Sat.	4	7.17	3.12
Sun.	5	8.00	3.30	Sun.	5	7.17	3.12
Mon.	6	8.00	3.30	Mon.	6	7.17	3.12
Tue.	7	8.00 N.M.	3.30	Tue	7	7.17	3.12
Wed.	8	8.00	3.30	Wed.	8	7.17	3.12
Thu.	9	8.00	3.30	Thu.	9	7.17	3.12
Fri.	10	8.00	3.30	Fri.	10	7.17	3.12
Sat.	11	8.00	3.30	Sat.	11	7.17	3.07
Sun.	12	11.00	3.30	Sun.	12	7.17	3.07
Mon.	13	11.30	3.30	Mon.	13	7.17	3.07
Tue.	14	11.50 F.Q. A.M.	3.30	Tue.	14	7.17	3.07
Wed.	15	12.10	3.30	Wed.	15	7.17	3.07
Thu.	16	12.30	3.30	Thu.	16	7.17	3.07
Fri.	17	1.00	3.30	Fri.	17	7.17	3.07
Sat.	18	1.20	3.30	Sat.	18	7.22	3.07
Sun.	19	1.50	3.30	Sun.	19	7.22	3.07
Mon.	20	2.20	3.30	Mon.	20	7.22	3.07
Tue.	21	No L.	No L.	Tue.	21	7.22	3.07
Wed.	22	No L. F.M.	No L.	Wed.	22	7.22	3.07
Thu.	23	No L.	No L.	Thu.	23	7.22	3.07
Fri.	24	8.00 P.M.	10.30 P.M.	Fri.	24	7.22	3.07
Sat.	25	8.00	11.10	Sat.	25	7.27	3.07
Sun.	26	8.00	11.50	Sun.	26	7.27	3.07
Mon.	27	8.00	12.10 A.M.	Mon.	27	7.27	3.07
Tue.	28	8.00	12.40	Tue.	28	7.27	3.07
Wed.	29	8.00 L.Q.	1.10	Wed.	29	7.27	3.07
Thu.	30	8.00	1.30	Thu.	30	7.27	3.07

ROOTS' EXHAUSTERS.

A half century of experience, up-to-date engineering and shop facilities embodied in these **World Famous Gas Exhausters.**

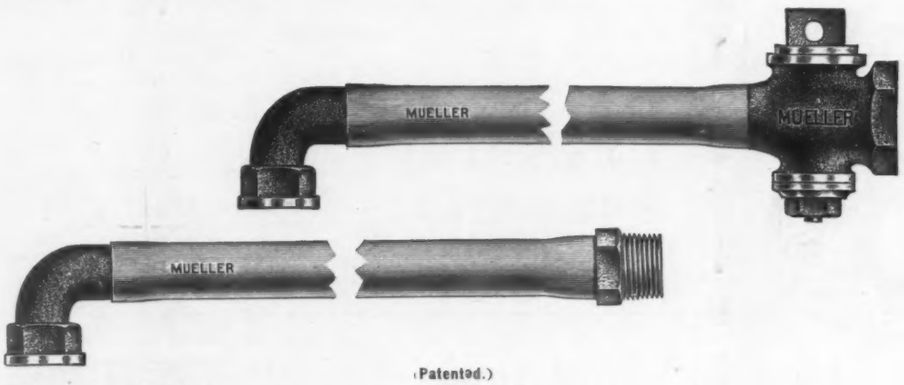


An Installation for the Peoples Gas Light and Coke Co,, Chicago, Ill., handling 1,000,000 cu, ft. per hour, under six (6) pounds per square inch.

P. H. & F. M. ROOTS COMPANY,

HOME OFFICE: Connersville, Ind. **NEW YORK OFFICE: 120-122 Liberty St.** **CHICAGO OFFICE: 1547 Marquette Bldg.**

SEND FOR POCKET EDITION OF "ENGINEERS' PRACTICAL REFERENCE BOOK."



(Patented.)

Mueller Sweat Joint Meter Connections

Have thr reeequisites of excellence--a good grade of lead pipe, Mueller Red Brass fittings and the skill of experienced workmen who make gas meter connections day after day. and in such way that every connection will stand up under our exacting tests.

Mueller Sweat Joint Meter Connections are made from three to two hundred lights and are Unconditionally Guaranteed.

TRADE MARK
MUELLER
REGISTERED

Works and General Offices,
DECATUR, ILL., U. S. A.
West Cerro Gordo St.

H. MUELLER MFG. CO.

Eastern Division,
NEW YORK, N.Y., U. S. A.
254 Canal St. (cor. Lafayette).

BRAY BURNERS HAVE BEEN USED FOR MORE THAN FORTY YEARS.

In that time they have been recommended and used by the leading gas experts, endorsed by the U. S. Government Inspectors of Gas, as well prominent State Inspectors.

To-day the Bray is the only high-grade, absolutely reliable open flame burner on the market.

W. M. CRANE COMPANY,

16, 18 and 20 West 32d Street, New York,

SOLE AGENTS FOR GEO. BRAY & CO., LEEDS, ENGLAND.

GEORGE ORMROD, Pres & Treas JOHN D ORMROD, Supt.
J. G. EBERLEIN, Secretary.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

CAST IRON GAS & WATER PIPE

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

COMBINATION INDICATING AND RECORDING
NITS OF WILLIAM H. BRISTOL ELECTRIC

PYROMETERS,

ESPECIALLY ADAPTED FOR GAS MANUFACTURING PLANTS.

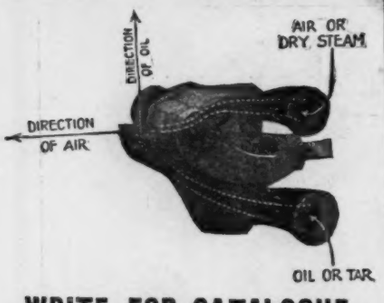
Indicating Instrument installed on Gauge Board for Gas Maker. Recording Instrument installed in Superintendent's Office.

Write for Special Bulletin No. 116 explaining applications of these Pyrometers in Gas Works of many Gas Manufacturing Companies. This new bulletin also gives lists of Gas Companies using the Wm. H. Bristol Electric Pyrometers.

THE BRISTOL CO., WATERBURY, CONN.

BRANCH OFFICES: NEW YORK. PITTSBURG. CHICAGO.

TAR BURNERS FOR BOILERS and COKE OVEN BENCHES.



WRITE FOR CATALOGUE.

HUNDREDS IN SUCCESSFUL OPERATION.

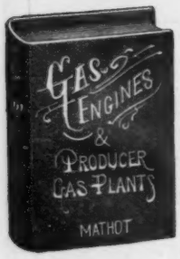
W. N. BEST,

ENGINEER IN CALORIC,

11 BROADWAY, - - - - NEW YORK CITY.

THERE IS NOTHING BETTER THAN THE BEST.

MODERN GAS ENGINES and PRODUCER GAS PLANTS,



By R. MATHOT, M.E.,

Containing a Preface by DUGALD CLERK, F.C.S., Indorsing the Book.

A PRACTICAL Treatise of 320 pages, Fully Illustrated by 175 Detail Illustrations, Setting Forth the Principles of Gas Engines and Producer Design, the Selection and Installation of an Engine, Conditions of Perfect Operation, Producer Gas Engines and their Possibilities, the Care of Gas Engines and Producer Gas Plants, with a Chapter on Volatile Hydrocarbons and Oil Engines.

Price, $2.50. For Sale by

A. M. CALLENDER & CO., - 42 Pine Street, New York City.

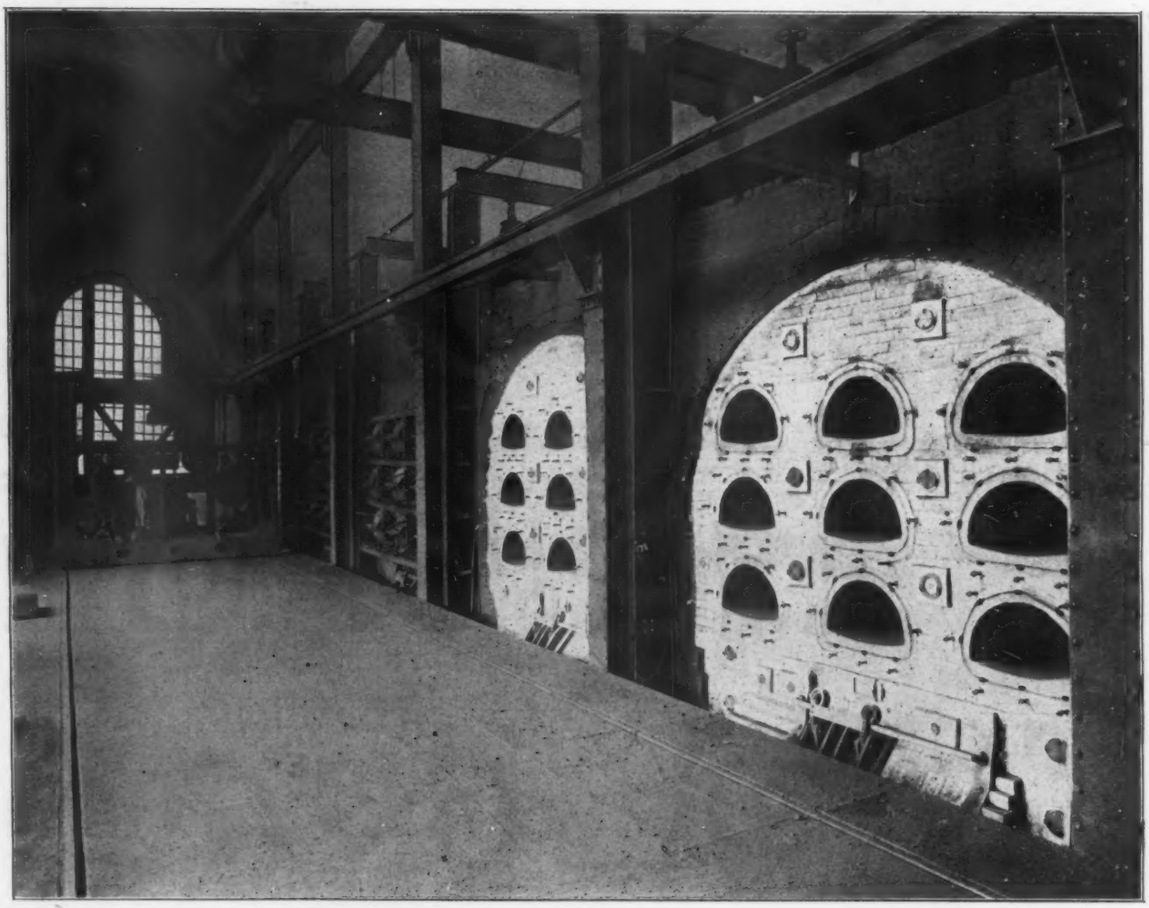
CABLE ADDRESS:
WILDOLPH, NEW YORK.

WILLIAM W. RANDOLPH, M.E.,
CONSULTING ENGINEER,
FORMERLY CHIEF ENGINEER AND VICE-PRESIDENT OF
HUMPHREYS & GLASGOW, INC.

165 BROADWAY
NEW YORK CITY.

EXAMINATION AND VALUATION OF PUBLIC UTILITY AND POWER CORPORATIONS.
ADVICE AS TO CONSTRUCTION AND MANAGEMENT.

WE STOP CLINKERS.



THE ABOVE INSTALLATION OF 20-FOOT THROUGH NINES HAS BEEN DUPLICATED. WHY? BECAUSE OF THE RESULTS OBTAINED. YOU CAN IMPROVE YOUR RESULTS WITH THE ECONOMIZER.

Horizontals--Inclines--Verticals.
NEW BENCHES--REFILLINGS.

THE IMPROVED EQUIPMENT COMPANY,

MAIN OFFICES: 60 WALL STREET, NEW YORK, N. Y.
Western Agents for the Dessau System of Vertical Retorts.
SOLE LICENSEES FOR THE DOHERTY BENCH FUEL ECONOMIZER.

FIELD'S ANALYSIS
For the Year 1908.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 40th Year of Publication.

PRICE, $5.

For Sale by AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
CHICAGO, 218 La Salle Street.
SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY

No. 36.

OF AMERICA

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others Interested in Municipal and Outside Lighting.

No. 38.

The Welsbach Multi-Flex Lamp,

The Lamp that's Made Good.

Made Good in the Factory-- that's why it's made good outside!

Thoroughly tested by many gas companies--then bought --and recommended by them to other gas companies.

Guaranteed wind, rain and bug proof. High candle power at normal gas consumption, and at decreased maintenance cost.

THE WELSBACH MULTI-FLEX ARC.

Height, 24 in. Diameter Reflector, 20 in. Diameter Globe, 11 in.

Made in 5-mantle form only, with ball joint, drip cup (on artificial gas only) and either F. F. clear, or Verre Krasna opaline globe. Packed 6 to a case. Price does not include mantles.

TWO FINISHES.

Dark Green Enamel.	*White Enamel with Gu'd Bands.*
Each.....$25.00	Each.....$2[illegible].50

WRITE FOR DISCOUNTS.

Welsbach Company,

Factories:

Gloucester, N. J. ——— Columbus, O.

Installation in a Business Block, Nashville, Tenn.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

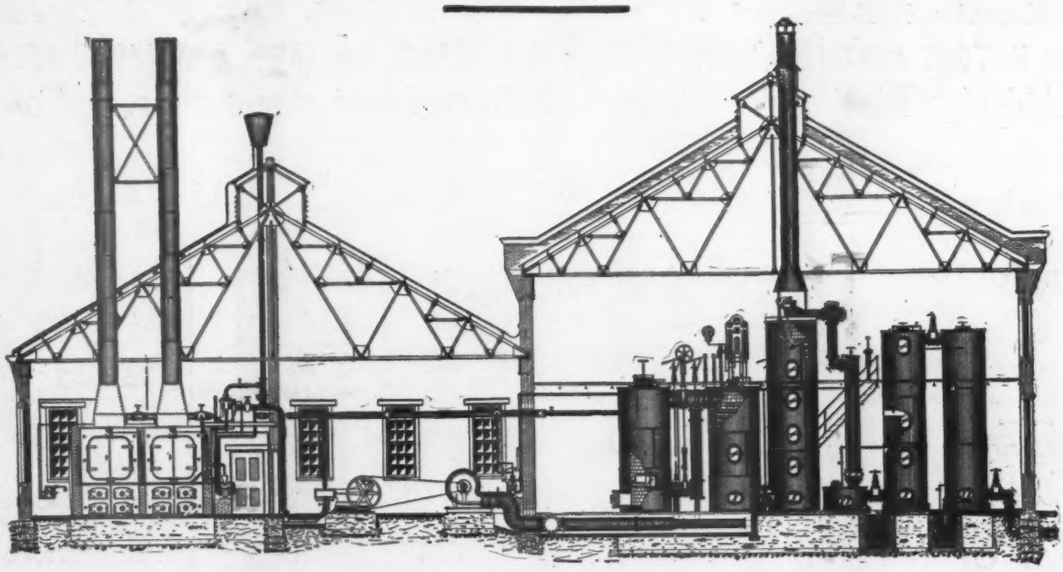
LESSEES, OPERATORS AND BUILDERS OF GAS WORKS.

Largest Builders of CARBURETTED WATER GAS PLANT IN AMERICA.

SOLE AMERICAN BUILDERS

OF THE

Standard Double-Superheater Lowe Water Gas Apparatus.



1909 CONTRACTS.

Belmar, N. J.	St. Albans, Vt.	Brockton, Mass.	Rosslyn, Va.
Abilene, Tex.	Jersey City, N. J.	Rockville, Conn.	Auburn, N. Y.
Pawtucket, R. I.	Everett, Mass.	Bay Shore, N. Y.	Lewiston, Me.
Middletown, Conn.	Burlington, Ia.	Sag Harbor, N. Y.	Moline, Ills.
Weatherford, Tex.	Des Moines, Ia.	Wilmington, Del.	Aurora, Ills.
New Bedford, Mass.	Pelham, N. Y.	Hammond, Ind.	Goldsboro, N. C.
Dallas, Tex.	Pleasantville, N. J.	Sumter, S. C.	Hoopeston, Ills.

TOTAL NUMBER OF SETS INSTALLED DURING YEAR 1909, ... 31
TOTAL NUMBER OF SETS INSTALLED TO JANUARY 1, 1910, ... 721
TOTAL DAILY CAPACITY TO JANUARY 1, 1910, ... 585,590,000 cu. ft.

Tar Extractors for Carburetted Water Gas
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts
Straight Standpipe Cleaners.
Waste Heat Boiler.
Hygrometer.
Meters for Regulating Air and Steam Supply to Water Gas Apparatus.
Emergency Kits for Persons Overcome by Gas.
Emergency Kits for Electric Shock.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

GEROULD'S IMPROVED RETORT CEMENT

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. NEW CASTLE, PA.

In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD,
29 North Mill St., New Castle, Pa.

KRATER-DINAS RETORT CEMENT.

Universally accepted to be the best cement for patching and repairing retorts, making up bench work, etc. Advantages: Powdered form; only mix with water; no waste; too much mixed, apply water and use the next time; adheres very easy; does not fall out by decarbonization. We guarantee or take back. Many re-orders and recommendations from America, Germany, France, Belgium, etc. Write for price and testimonials.

ERNST STRASSBURGER, Sole Importer,
2630 Lincoln Avenue, Chicago, Ills.

"BEST BY TEST."

ESTABLISHED 1868.

L. N. RANCKE, V. Pres. & Mgr. E. L. RIEHA, Engineer.

BALTIMORE RETORT & FIRE BRICK COMPANY.

COAL GAS BENCHES.

HORIZONTAL RETORTS.
INCLINED RETORTS.
VERTICAL CHAMBERS.

WALDO BROS., 102 Milk St., **BOSTON MASS.,**
NEW ENGLAND AGENTS.

THE PARKER-RUSSELL MINING AND MFG. CO.,

Saint Louis, Missouri. **New York Office, 45 Broadway.**

GAS RETORT BENCHES, HORIZONTALS, VERTICALS, INCLINES, STOKING MACHINERY.

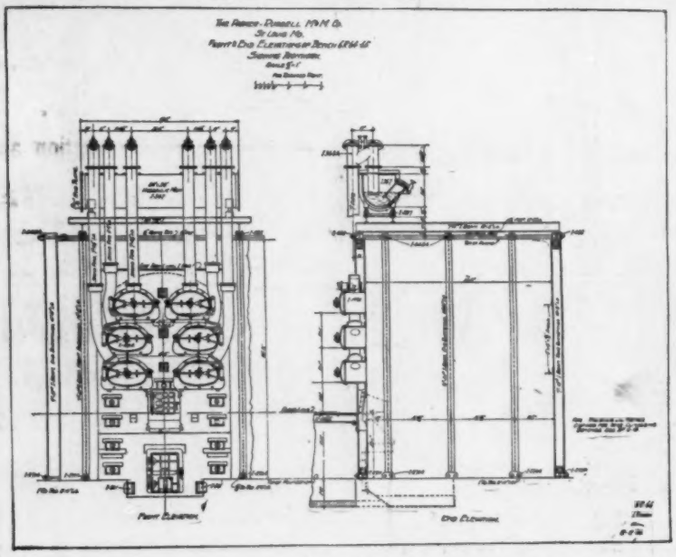
Fiddes-Aldridge Discharging-Charger discharges and places charge at one stroke.

We Design All Our Own Ironwork.

Mouthpieces Have Steel Cottar Bars, Catches and Eccentric Pin.

All Castings are Extra Heavy.

We Build Tar and Ammonia Offtake Systems Adapted to Your Needs.



We Carry a Large Number of Bench Mountings on Hand, also a Heavy Stock of Retorts and Settings.

When You Deal with Us You Deal with the Manufacturer Direct.

Correspondence Solicited.

All Contracts made as of Saint Louis.

BENCHES.

VERTICAL.--We erect Vertical Benches on the continuous and intermittent systems. We are the Sole Agents of the United States and Canada west of Buffalo, Pittsburg and Toronto, for the Woodall-Duckham Continuous System. We consider this the best system on the market. There is one installation in successful operation at La Grange, Ills. High yield. Very low cost of labor.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One to Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office: *411 Olive Street, Continental Bank,* **ST. LOUIS, MO.**

EXPERT INSPECTION of Holders and Other Structures During Construction.
ECONOMIC DESIGN of Steel Structures, Reinforced Concrete, Masonry and Foundations.
CHAMBERS & HONE, Consulting Engineers. . . . . 1 Liberty Street, New York City.

Bronder Patent Stoking·Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada, Detroit, Seattle, Rochester and St. Louis.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich., and Cincinnati, Ohio. These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

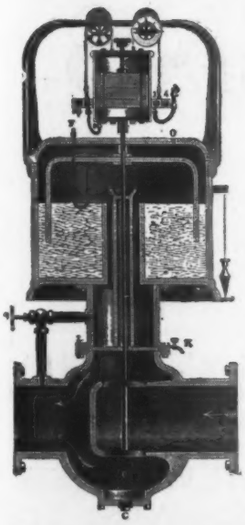
Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins. Coke Screening and Measuring Plants a Specialty.

G. A. BRONDER,
Contracting Engineer and Builder,
229 BROADWAY, NEW YORK.

CONNELLY IRON SPONGE AND GOVERNOR CO.,



Automatic, Balance, High Pressure and Service Governors,
Unison Telemetric Pressure Gauge,
Iron Sponge, Purifying Material for Gas Purification, Manufacturers of Jones Jet Photometers, The National Smoke and Ammonia Helmet, Sulphur Testers, High and Low Pressure House Governors. . . . . .
Wide Experience in High Pressure Installation and Extension.

PACIFIC COAST AGENT: VAN E. BRITTON, SAN FRANCISCO, CAL.

50 CHURCH ST., NEW YORK CITY.
295 WEST 22D ST., CHICAGO, ILLS.

12-Inch High Pressure Governor.

REYNOLDS' GAS REGULATOR COMPANY,

ANDERSON, IND., U. S. A.

We make all sizes for all classes of reduction,

Double and Single District Stations,
And Individual Service Governors for Reducing High Pressure.

HOLDER GOVERNORS
And Low Pressure Regulators, all of the Dry Diaphragm type.

English Agents:
THE BRYAN DONKIN CO., LTD., Chesterfield, England.

Write for Catalog.

Combination Governor.
(Governor and Mercury Seal.)

FIELD'S ANALYSIS FOR THE YEAR 1908.

PRICE, $5. FOR SALE BY
AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

COAL TAR AND AMMONIA,

By GEORGE LUNGE, PH.D. Third and Enlarged Edition.
Price, $15. For Sale by
AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

BERWIND-WHITE COAL MINING COMPANY'S

Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Betz Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming .

A. C. M. AZOY,
General Agent and Manager Gas Coal Department,
No. 1 Broadway, New York.

CHAMBER OVENS.

Do You Know About Chamber Ovens? Horizontal, Vertical, or Inclined.

If your output is over 250,000 feet per diem don't fail to consult

THE CHAMBER OVEN CO.,
405 Keene St.,
MILWAUKEE, WIS.

FRED. BREDEL, President.
WM. H. CAMPBELL, Eastern Agent.
Virginia State Insurance Building, Richmond, Va.

Chamber Ovens Erected at Padua, Italy.

PETER YOUNG, President.
Works, LOCKPORT STATION, PA.

ESTABLISHED 1864.
JAMES GARDNER, JR., CO.,
Successor to WILLIAM GARDNER & SON.

N. A. YOUNG, Secretary and Treasurer.
Address all communications to JAMES GARDNER, JR., CO., Bolivar, Pa.

Fire Clay Goods for Gas Works.

The "Gas World" Analyses of Municipal Gas Accounts, FOR 1908-9, AND The "Gas World" Analyses of Gas Companies' Accounts, FOR 1908.

EVERY GAS ENGINEER AND MANAGER SHOULD HAVE A COPY OF THESE INVALUABLE AND UP-TO-DATE WORKS.

Price, $4 each. For Sale by AMERICAN GAS-LIGHT JOURNAL 42 Pine Street, New York City.

KELLER ADJUSTABLE COKE CRUSHER

Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER

Columbus, Ind.

Correspondence Solicited.

AWARDED A SILVER MEDAL AT THE WORLD'S FAIR, ST. LOUIS, 1904.

AGENTS.

Pacific Coast—VAN E. BRITTON, 269 Monadnock Building, San Francisco, Cal.

Great Britain—PARKER & LESTER, Old Kent Road, London.

MANUFACTURED BY

SAFETY GAS MAIN STOPPER CO.,

257-263 East 133d Street,

NEW YORK CITY.

PATENTS, TRADE MARKS, COPYRIGHTS.

ROYAL E. BURNHAM,

Solicitor of Patents and Counsellor in Patent Causes.

833 Bond Building, Washington, D. C.

Send for Pamphlet on Patents.

EDMUND H. McCULLOUGH, President. H. C. ADAMS, 1st Vice-President. CHAS. F. GODSHALL, 2d Vice-Pres. & Treas. HENRY WHARTON, Secretary. C. B. NICHOLS, Assistant Secretary.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J., WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

GAS MAINS—SERVICE PIPES.

Their installation for High or Low Pressure is the work in which we have specialized for years. Because of our Facilities and Experience, many Gas Companies prefer to contract with us for such work, rather than to execute it themselves. It proves to be as cheap in the end. We solicit inquiries. SULLIVAN BROS.,

Telephone Connection. 11 Main St., Flushing, N. Y.

JOHN CABOT, President. GEO. D. CABOT, Secretary.

1412-1428 Adams Street, Hoboken, N. J.

PURIFIER AND SCRUBBER TRAYS

Church's Patent Trays,

Reversible; Strongest; Most Easily Repaired.

We also Supply the Cheapest and Strongest

Reversible Bolted Trays.

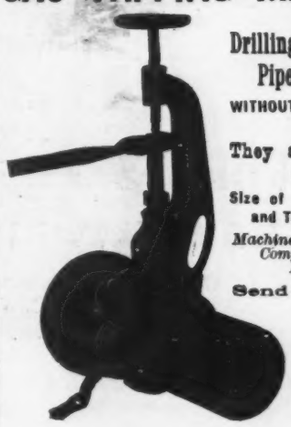
Special Trays for Iron Oxide in Either Style

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.



They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,

DAYTON, O.

Standard Oil Company,

GAS NAPTHA DEPARTMENT.

GAS NAPTHA.

GAS OIL.

Correspondence Solicited.

26 Broadway, New York City.

DAVIS & FARNUM MANUFACTURING CO.,

Waltham, Mass.

GAS HOLDERS

Steel Tanks for Naptha Storage, Machinery for Coal and Water Gas Plants.

H. M. BYLLESBY & COMPANY

(INCORPORATED).

GAS ENGINEERS,

DESIGN, CONSTRUCT AND OPERATE
COMPLETE COAL, WATER AND CRUDE OIL GAS PLANTS.

EXAMINATIONS AND REPORTS.

218 LA SALLE STREET, CHICAGO.

Oklahoma City, Okla. Mobile, Ala. San Diego, Cal.

ALEX. C. HUMPHREYS, President.
EMILE GUILLAUDEU, Treasurer.
ROBT. O. LUQUEER, Secretary.
HOWARD E. WHITE, General Counsel.

EUROPEAN CORRESPONDENTS.
HUMPHREYS & GLASGOW,
LONDON. — BRUSSELS.

HUMPHREYS & GLASGOW, INC.,

CONSULTING ENGINEERS.

ADVICE AS TO EXTENSION, MANAGEMENT AND RECONSTRUCTION OF GAS AND ELECTRIC PLANTS.

COMPLETE EXAMINATIONS MADE. PROPERTIES PURCHASED.

CITY INVESTING BUILDING, 165 BROADWAY, NEW YORK.

COAL AND COKE ELEVATING AND STORAGE PLANTS.

Coal Storage Building of the Lowell Gas Co., Mass. Coal Stored in the Building with a Hunt Conveyor.

THE VERTICAL PIPES WHICH SHOW SO PROMINENTLY IN THE ENGRAVING EACH CARRY A THERMOMETER WHICH GIVES WARNING OF A RISE IN TEMPERATURE. THE COAL CAN THEN BE DRAWN BY GRAVITY INTO THE CONVEYOR BUCKETS, WHICH RUN IN A TUNNEL DOWN THE CENTER OF THE BUILDING BEFORE ANY DAMAGE IS DONE.

"HUNT"
NOISELESS CONVEYOR.

McDONALD-MANN
QUENCHING
CHUTES.

BULLETIN D-1, describing our machinery, sent on request.

C. W. HUNT COMPANY,
WEST NEW BRIGHTON, NEW YORK.
NEW YORK OFFICE, - 45 BROADWAY.

HENRY I. LEA,

CONSULTING GAS ENGINEER.

DESIGN---CONSTRUCTION---MANAGEMENT
OF
GAS PLANTS
FOR
CITY SUPPLY---
POWER DEVELOPMENT---
INDUSTRIAL HEATING.

EXAMINATIONS AND REPORTS.

1519 PEOPLES GAS BLDG., CHICAGO.

FIELD'S ANALYSIS FOR THE YEAR 1908

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland; being the 40th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by

AMERICAN GAS LIGHT JOURNAL, 42 Pine St., N. Y. City.

THE BARTLETT HAYWARD CO.
ENGINEERS & FOUNDERS.
BALTIMORE. NEW YORK.
COAL & WATER GAS PLANTS
GAS HOLDERS.

DISCHARGING SIDE OF INCLINED RETORTS.

DIDIER-MARCH COMPANY,

Hudson Terminal Building,

WORKS:
Keasbey, Perth Amboy, N. J.

30 Church Street,
NEW YORK, N. Y.

DESSAU SYSTEM OF VERTICAL RETORTS,

"The Only System in Successful Operation."

PLATFORM ON TOP OF DESSAU BENCHES.

First Installation in the United States of America,

PROVIDENCE, R. I., 18 BENCHES, 180 RETORTS,

Complete, with

Retort House, Coal and Coke Handling Machinery and Storage Bins.

HORIZONTALS AND INCLINES OF APPROVED TYPES.

Correspondence Solicited. **FREDERICK J. MAYER, General Manager.**

NOTICE TO GAS COMPANIES.

I have submitted to my Patent Attorneys, Messrs. Wood & Wood, of Cincinnati, O., my patent No. 632,400, on "Process for Purifying Gas," and they advised me that the patent is valid and extremely meritorious. Moreover, they have advised me that anyone having installed an apparatus capable of being adjusted to accomplish a reversal of the flow of gas is an infringer, and to prosecute such infringers, and the trade will please take notice that I will institute necessary suits to protect my rights.

B. E. CHOLLAR.

KERR MURRAY MANUFACTURING COMPANY,

Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS
AND STEEL TANKS,

Latest Improved

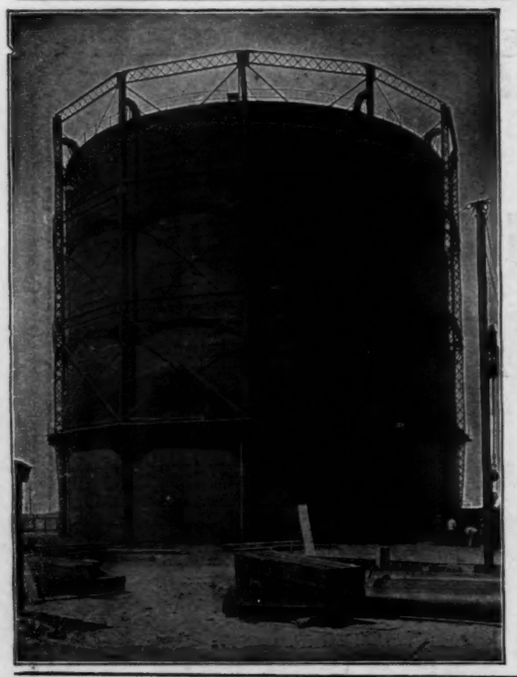
ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

Street Specials and Valves.

ADDRESS:

KERR MURRAY MANUFACTURING COMPANY, {FORT WAYNE, IND.



JOHN FOWLER, President. J. SCOTT FOWLER, Vice-Pres. & Treas.

DEILY & FOWLER MFG. CO.,

39 Laurel Street, Philadelphia, Pa.

ESTABLISHED 1842. INCORPORATED 1908

BUILDERS OF

GASHOLDERS,

Single-Lift or Telescopic,

With or Without Steel Tanks.

Oil Storage Tanks, Water Tanks, Etc.

ESTIMATES CHEERFULLY FURNISHED.

CORRESPONDENCE SOLICITED.

ASK ABOUT OUR

VICTOR BLOWERS,

For Use with Industrial Gas Appliances.

WE ALSO SOLICIT YOUR INQUIRIES FOR

GAS EXHAUSTERS,
HIGH PRESSURE GAS PUMPS,
BOOSTERS,
HUNTOON GOVERNORS,
PRESSURE REGULATORS,
BLAST VALVES,
ETC., ETC.

THE CONNERSVILLE BLOWER COMPANY,

Connersville Indiana, U. S. A.

NEW YORK OFFICE, 50 Church Street. CHICAGO OFFICE, 536 Monadnock Building.

AMERICAN GAS ENGINEERING PRACTICE,

By M. NISBET LATTA, C.E. PRICE, $4.50.

For Sale by
AMERICAN GAS LIGHT JOURNAL, - 42 Pine St., New York City.

D. McDONALD & CO.,

971-997 BROADWAY, ALBANY, N. Y.,

MANUFACTURERS OF

DRY GAS METERS, STATION METERS, PREPAYMENT METERS, METER PROVERS AND GAUGES.

THE GLOVER PREPAYMENT METER,

Simple, Strong, Satisfactory.

THE HINMAN STATION METER DRUM,

The greatest advance that has been made in 20 years in the ACCURATE and ECONOMICAL measurement of gas in large quantities. :: :: ::

NEW YORK OFFICE: 561 West 47th Street. | ALBANY OFFICE: 991 Broadway. | CHICAGO OFFICE: Jefferson and Monroe Streets.

We can meet your requirements for

STATION METERS

On all capacities from 1,500 to 500,000 cu. ft. per hour.

One-half the Cost—One-tenth the Space of Old Style Wet Meters.

When in Need of Station Meters Write

ROTARY METER COMPANY,

280 Broadway, NEW YORK.

Our Literature and all information will be sent on request.

The Sprague Meter Co.

Manufacturers of

Cast Iron Gas Meters

for

Artificial or Natural Gas

Plain or Prepayment

Lower in first cost and cheaper to maintain than any meter on the market.

Write us for particulars.

The Sprague Meter Company

203 Water St., Bridgeport, Conn.

R. D. WOOD & CO.,

400 CHESTNUT ST., PHILADELPHIA,

MANUFACTURERS OF

Cast Iron Pipe.

HEAVY LOAM CASTINGS,

Dunham Specials,

Hydraulic Work,

LAMP POSTS, VALVES, ETC.,

Gas Power Plants with Producers.

BUILDERS OF

Gasholders.

Single or Multiple Lifts, with or without Metal Tanks.

PURIFIERS, CONDENSERS, SCRUBBERS, BENCH WORK.

Cutler's Patent Freezing Preventer for Holder Cups.

NATHANIEL TUFTS METER COMPANY,

455 Commercial St., Boston, Mass.

PREPAYMENT GAS METERS,

WET AND DRY GAS METERS, STATION METERS, ETC.

REPAIRING OF ALL MAKES OF METERS, AND FITTED WITH OUR PREPAYMENT ATTACHMENT.

B

METERS.

INCREASED CAPACITY.

INCREASED EFFICIENCY.

PREPAYMENT METERS, STATION METERS, METER PROVERS, ETC.

PROMPT AND CAREFUL ATTENTION TO ALL REPAIR WORK.

MARYLAND METER COMPANY,

BALTIMORE.—CHICAGO.

YOU NEED ONE OR MORE OF OUR COMPLAINT METERS.

METERS, Plain and Prepayment,

For Artificial or Natural Gas.

Repairing All Makes and Attachments Added if Desired.

SPECIAL METERS FOR ACETYLENE.

KEYSTONE METER COMPANY,

ROYERSFORD, PA.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Wet and Dry Gas Meters, Station Meters, Meter Provers,
Photometrical Apparatus, Gauges,

PREPAYMENT METERS,

REGULAR METERS REFITTED WITH PREPAYMENT ATTACHMENTS.

HELME & McILHENNY,

Established 1848. **1339 to 1349 Cherry Street, Philadelphia, Pa.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION. CORRESPONDENCE SOLICITED.

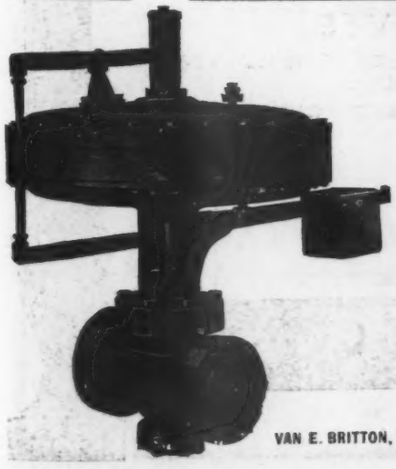
METRIC METAL COMPANY,

MAKERS OF

GAS METERS for NATURAL and ARTIFICIAL GAS.

Special Attention given to Repairing METERS of all Makes.

FACTORY AT ERIE, PA.



THE FULTON GAS PRESSURE GOVERNORS

For Artificial or Natural Gas.
For District or Individual Service.

Our Improved **Duplex Sensitive Governor** for district service will reduce high pressure gas to inches of water without variation. Absolutely safe and reliable. No complicated mechanism to get out of order. No auxiliary regulators or other devices to assist the main governor required. The most simple and perfect governor ever placed on the market. We also manufacture Holder Governors, Compressor Governors and Individual Service Governors for any inlet and outlet pressure.

More than 20 years' experience with the largest gas companies. Send for Catalog.

THE CHAPLIN-FULTON MFG. CO.,

VAN E. BRITTON, Pacific Coast Agent, Monadnock Bldg., San Francisco, Cal. 28-34 PENN AVE., PITTSBURGH, PA.

THE WESTERN GAS CONSTRUCTION COMPANY

WORKS AND MAIN OFFICE FORT WAYNE IND U S A

GAS ENGINEERS

EASTERN OFFICE NEW YORK CITY. WESTERN OFFICE SAN FRANCISCO.

1138 Broad Exchange Building. 589 Howard Street.

SMALL VALVES —AND— LARGE VALVES

AND ALL ARE QUALITY VALVES.

THE INDIANA STEEL CO. RECENTLY ORDERED ABOUT 300 OF OUR VALVES FOR THE COKE OVEN PLANT AT GARY, IND.

THIS PLANT WILL **DUPLICATE** THEIR JOLIET, ILLS., PLANT, WHERE **WE FURNISHED THE VALVES.**

CONTRACTORS AND BUILDERS EVERYTHING FOR A GAS PLANT